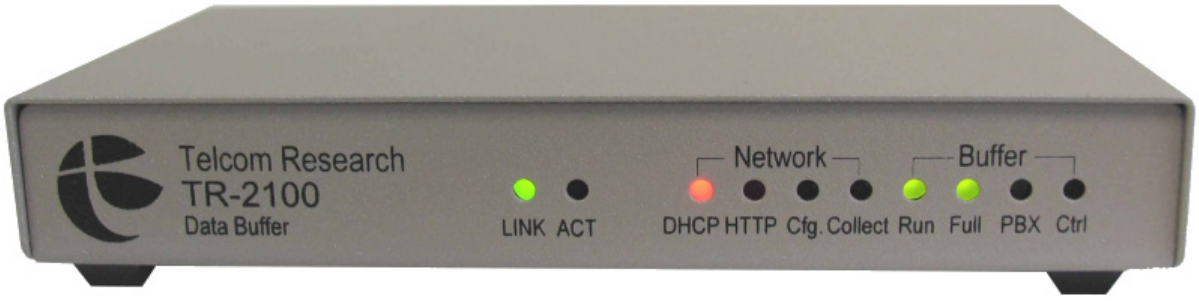
TR-2100

Data Buffer

Installation and Users Reference Manual



TELCOM RESEARCH

TR-2100 Data Buffer

Installation and Users Reference Manual

Copyright© 2006 by Telcom Research
All rights reserved

Telcom Research
3375 North Service Road
Burlington, Ontario Canada
L7N 3G2
Phone 905-336-2450 • Fax 905-336-1487
http://www.telcomresearch.com

The information in this document is subject to change without notice and should not be construed as a commitment by Telcom Research. Telcom Research assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

Telcom Research or its affiliated companies assume no responsibility for the use or reliability of software on equipment that is not manufactured or supplied by Telcom Research.

TR-2100 is a trademark of Telcom Research.

Omnitronix and Data-Link are trademarks of Omnitronix, Incorporated.

PollCat is a trademark of Western Telematic, Incorporated.

All other trademarks are the property of their respective owners.

Table of Contents

Introduction 1
- Network and Modem Access 1
- High security 2
- Programmable Upload Interval 2
- Non-volatile Flash Memory 2
- Fast and Convenient Firmware Updates 2
- High Compression Storage 2
- Compatibility 2

Overview 3
- Communications Commands 4
- Internet Protocol Features 4
- Buffer Configuration Options 4
  - TR-2100 Windows Configuration Program 4
  - TR-2100 WEB Interface 5
  - Configuration with an RS-232 terminal emulation program 5
  - Telnet Configuration 5
  - Reverse ARP Configuration 5
  - Front Panel Indicators 5
  - Rear Panel Indicators 6
  - Rear Panel Connectors 6
  - Supplied Accessories 7

Installation 9
- Power Supply 9
- Connecting Directly to a Computer Serial Port 9
- Connecting to the Data Source 10
- Ethernet Connection 10

Data Collection 13
- CDR Data Collection 13
- Input/Output Records 13
- Buffer State LED Interpretation 13

TR-2100 Windows Configuration Program 15
- Connecting to the PC 15
- Menu Options 16
  - File Menu 16
  - Options Menu 17
- Main Controls and Indicators 18
  - Control Port Group 18
  - Data Port Group 19

Ungrouped Controls and Indicators 19
Main Controls and Indicators, Bottom of Page 20
Ethernet Connection 21
Setting the IP Parameters 21
Automatically Setting the IP Parameters using DHCP 22
Setting the IP Parameters Manually 23
Reserved IP Addresses For Private Networks 24
Setting the TCP Parameters 25
Setting the TCP Ports 25
Setting the TCP Timeouts 26
Site and Data Collection Settings 27
Site Identification 27
End of Record Character 27
Data Collection Method 28
Record Modifications 28
Command Sets 29
Setting the Users Accounts Security Parameters 30
SNTP (Time Server) Settings 31
Primary NTP Server 31
Secondary NTP Server 32
Time Zone 32
Automatically Adjust for Daylight Time 32
Sync every XX Hours 32
FTP Upload Settings 33
FTP Server 33
FTP Server Directory 33
Base File Name 33
File Extension 34
FTP Port 34
Upload Empty 34
Compressed 34
Automatic Upload 34
Delete Uploaded Records 34
Upload When XX% Full 34
Upload Interval 34
FTP User Name 34
FTP Password 34
Setting the TCP/IP Security Parameters 35
Non-Contiguous Subnet Bits 36
Statistics 36

DHCP Parameters 37
General Information 38
Terminal 39
Display Window 39
Clear Button 39
Ctrl-A, Ctrl-B, Ctrl-V and Ctrl-T 40
Send 40
Command Window 40
Advanced 41
Get Resets 41
Clear Resets 41
Clear Statistics 41
Clear Buffer 41
Factory Reset 42
Flash Program Memory Update 43
Automatic Flash Update 43
Starting The Flash Update 43
Flash Update Errors 45
Keeping Current Settings 46
Network Finder 47
Exit 47
Find Us! 47
By Name 47
By IP 47
Connect 47
Copy All 48
Connect Using… 48
TR-2100 Web Configuration 51
How to Connect 51
NetBIOS Name Resolution 51
DNS Name Resolution 51
No Name Resolution 51
Behind A Firewall 52
Login Screen 52
WEB Configuration Home Page 53
Ethernet Configuration WEB Page 54
Use Full Duplex 54
Allow Extended Cable Length 54
DHCP (IP) Configuration WEB Page 55
IP Configuration WEB Page 56

TCP Configuration WEB Page 57
Serial Port Configuration WEB Page 58
Password Configuration WEB Page (Security and Accounts) 58
DHCP Information WEB Page 59
Statistics WEB Page 60
FTP Push Configuration WEB Page 61
Time Server Configuration WEB Page 62
Version Information WEB Page 63
TCP/IP Security WEB Page 63
Site and Collection Configuration 64
Online Help 65
TR-2100 Interactive Monitor 67
Connecting with Telnet 67
Name Resolution 67
NetBIOS Name Resolution 68
DNS Name Resolution 68
No Name Resolution 68
Behind A Firewall 69
Telnet Logon 69
Connecting With a Terminal Emulator 69
Recommended Terminal Settings 69
Interactive Monitor Menu Tree 70
Configuration Starting Page 72
Configure IP 73
Configure TCP 73
Configure TCP/IP Security 74
FTP Push Configuration 74
Site and Collection Configuration 75
User/Password Configuration Page 75
Serial Port Configuration 76
Time Server Configuration 76
Configure Ethernet 77
Use Full Duplex 77
Allow Extended Cable Length 77
Compatibility Settings 77
Network and Serial Port Statistics 78
Display DHCP Information 78
Version Information 79
Reset to FACTORY DEFAULTS 79
Restore PREVIOUS SETTINGS 80

EXIT, SAVING CHANGES 80
EXIT WITHOUT saving changes 81
Reverse ARP Configuration 83
Checking Address availability 84
Using PING 84
Windows ARP Command 84
Linux or Unix ARP Command 84
Connecting with Telnet 85
Connecting with a WEB Browser 85
Clearing the ARP entry from your Computer 85
Clearing the Reverse ARP Address from the TR-2100 85
Collecting Data from the TR-2100 87
Automatic FTP Upload 87
From the Control Port 87
From the Telnet Data Retrieval Port 87
Connecting 88
Disconnecting 88
Automatic FTP Upload 89
FTP Server 89
FTP Directory 89
File Base Name 90
File Extension 90
Upload Interval 90
Upload When Empty 90
Upload Compressed 90
Upload When XX% Full 90
FTP Port 90
Automatic Upload 90
Delete Uploaded Records 90
FTP User Name 90
FTP Password 90
Command Sets 91
TR-2100 Native commands 91
Serial Port Configuration Commands 92
‘^T’ GetBaud0 92
‘^T’ SetBaud0 92
‘^T’ GetBaud1 92
‘^T’ SetBaud1 92
‘^T’ GetSerialDebug 92
‘^T’ SetSerialDebug 92

IP Configuration Commands 93
‘^T’ GetDHCP 93
‘^T’ SetDHCP 93
‘^T’ GetDHCPInfo 93
‘^T’ GetIP 94
‘^T’ SetIP 94
‘^T’ GetMask 94
‘^T’ SetMask 94
‘^T’ GetDNS1 94
‘^T’ SetDNS1 94
‘^T’ GetDNS2 94
‘^T’ SetDNS2 94
‘^T’ GetDNS3 94
‘^T’ SetDNS3 95
‘^T’ GetGateway 95
‘^T’ SetGateway 95
‘^T’ GetHost 95
‘^T’ SetHost 95
‘^T’ GetDomain 95
‘^T’ SetDomain 95
DHCP Assigned Configuration 95
‘^T’ GetDHCPIP 95
‘^T’ GetDHCPMask 95
‘^T’ GetDHCPDNS1 95
‘^T’ GetDHCPDNS2 96
‘^T’ GetDHCPDNS3 96
‘^T’ GetDHCPGateway 96
‘^T’ GetDHCPServer 96
‘^T’ DHCPGetDomain 96
TCP Configuration Commands 96
‘^T’ GetCfgPort 96
‘^T’ SetCfgPort 96
‘^T’ GetCfgTimeout 96
‘^T’ SetCfgTimeout 96
‘^T’ GetCharGenPort 96
‘^T’ SetCharGenPort 97
‘^T’ GetCharGenTimeout 97
‘^T’ SetCharGenTimeout 97
‘^T’ GetRetrievalPort 97
‘^T’ SetRetrievalPort 97

‘^T’ GetRetrievalTimeout 97
‘^T’ SetRetrievalTimeout 97
‘^T’ GetEchoRetrieval 97
‘^T’ SetEchoRetrieval 97
‘^T’ GetEchoPort 97
‘^T’ SetEchoPort 97
‘^T’ GetEchoTimeout 98
‘^T’ SetEchoTimeout 98
‘^T’ GetHTTPPort 98
‘^T’ SetHTTPPort 98
‘^T’ GetHTTPTimeout 98
‘^T’ SetHTTPTimeout 98
‘^T’ GetTCPTimeout 98
‘^T’ SetTCPTimeout 98
Time Server Settings 98
'^T' SetTimeServer1 98
'^T' GetTimeServer1 98
'^T' SetTimeServer2 99
'^T' GetTimeServer2 99
'^T' SetTimeSyncInterval 99
'^T' GetTimeSyncInterval 99
'^T' SetTimeZoneIndex 99
'^T' GetTimeZoneIndex 99
'^T' SyncNTPTime 99
'^T' GetNTPSyncTime 99
'^T' SetTime 99
FTP Upload (Push) Settings 100
'^T' SetFTPClientAutoUpload 100
'^T' GetFTPClientAutoUpload 100
'^T' SetFTPClientDeleteRecords 100
'^T' GetFTPClientDeleteRecords 100
'^T' SetFTPClientDirectory 100
'^T' GetFTPClientDirectory 100
'^T' SetFTPClientFileBaseName 100
'^T' GetFTPClientFileBaseName 100
'^T' SetFTPClientFileExtension 100
'^T' GetFTPClientFileExtension 100
'^T' SetFTPClientInterval 100
'^T' GetFTPClientInterval 100
'^T' SetFTPClientUser 100

'^T' GetFTPClientUser 101
'^T' SetFTPClientPass 101
'^T' GetFTPClientPass 101
'^T' SetFTPClientPercent 101
'^T' GetFTPClientPercent 101
'^T' SetFTPClientPort 101
'^T' GetFTPClientPort 101
'^T' SetFTPCompression 101
'^T' GetFTPCompression 101
'^T' StartFTPUpload 101
'^T' GetFTPNextUpload 101
'^T' SetFTPServer 101
'^T' GetFTPServer 101
'^T' SetFTPTimeout 102
'^T' GetFTPTimeout 102
'^T' SetUploadEmpty 102
'^T' GetUploadEmpty 102
TCP/IP Security Configuration Commands 102
‘^T’ SetEnableIPSec 102
‘^T’ GetEnableIPSec 102
‘^T’ SetSecIPx 102
‘^T’ GetSecIPx 102
‘^T’ SetSecMaskx 102
‘^T’ GetSecMaskx 102
Users Security Configuration Commands 102
‘^T’ GetCfgName 103
‘^T’ SetCfgName 103
‘^T’ GetCfgPass 103
‘^T’ SetCfgPass 103
‘^T’ GetHTTPName 103
‘^T’ SetHTTPName 103
‘^T’ GetHTTPPass 103
‘^T’ SetHTTPPass 103
‘^T’ GetPollName 103
‘^T’ SetPollName 103
‘^T’ GetPollPass 103
‘^T’ SetPollPass 104
Buffer Configuration Commands 104
'^T' SetEnableMDR2000 104
'^T' GetEnableMDR2000 104

'^T' SetEnablePollCat 104
'^T' GetEnablePollCat 104
'^T' SetEnableOmnitronix 104
'^T' GetEnableOmnitronix 104
'^T' SetCollectMode 104
'^T' GetCollectMode 104
'^T' SetSiteID 104
'^T' GetSiteID 104
'^T' SetAvayaPort 104
'^T' GetAvayaPort 104
'^T' SetEORChar 105
'^T' GetEORChar 105
'^T' SetAddLineNumber 105
'^T' GetAddLineNumber 105
'^T' SetAddDateTime 105
'^T' GetAddDateTime 105
'^T' SetShortDateTime 105
'^T' GetShortDateTime 105
'^T' SetAddCRC 105
'^T' GetAddCRC 105
'^T' GetDateTime 106
'^T' SetDaylight 106
'^T' GetDaylight 106
‘^T’ ClearBuffer 106
‘^T’ FactroyReset 106
Buffer Status Inquiry Commands 106
'^T' GetEthernetAddress 106
'^T' GetBuildInfo 106
'^T' GetCapacity 106
'^T' GetSerialNumber 106
'^T' GetSoftwareBuildDate 106
'^T' GetSoftwareBuildTime 106
'^T' GetSoftwareRevision 106
'^T' GetHardwareBuildDate 106
'^T' GetHardwareBuildTime 106
'^T' GetHardwareRevision 107
'^T' GetResetEvents 107
'^T' ClearResetEvents 107
'^T' ClearStats 107
MDR-2000 Compatible Commands 107

‘^V’ BE 107
‘^V’ CL 108
‘^V’ DB 108
‘^V’ DU 108
‘^V’ ID 108
‘^V’ IM 108
‘^V’ MR 108
‘^V’ OK 108
‘^V’ SD 109
‘^V’ SM 109
‘^V’ XT 109
Additional MDR-2000 style Commands 109
‘^V’ DA 109
‘^V’ SS 109
Omnitronix Data-Link Compatible Commands 109
? 109
ACCESS 109
BYPASS 109
CLEAR 110
CLOCK 110
COLDSTART 110
COUNT 110
CRC 110
DEFAULT 110
FREE 110
NEXT 110
RESEND 110
PROMPT 110
PRT 110
PUSHTEST 110
RESTART 110
RL 110
RLMODE 110
SETUP 110
STAMP 111
STATUS 111
TAG 111
WAIT 111
ZAP 111
ZERO 111

WTI PollCat Compatible Commands 111
^B00 111
^B01 111
^B02 111
^B03 111
^B04 111
^B05 111
^B06 112
^B13 112
^B16 112
^B20 112
^B21 112
^B22 112
^B25 112
^B26 112
^B29 112
^B30 112
^B39 112
^B50 112
^B52 112
^B54 112
^B59 112
^B62 112
^B66 113
^B67 113
^B72 113
^B75 113
^B91 113
^B92 113
^B95 113
^B97 113
^B98 113
^B99 113
Trouble Shooting 115
Fatal Errors 115
RAM Test Failure 115
Ethernet Controller Failure 115
Program Memory Failure 115
Microprocessor Configuration Failures 116
Non Fatal Errors 116

Link LED does not light 116
No LEDs light when power is applied 116
Unable to communicate with the Ctrl Port 116
Unable to receive records on the Data Port 116
Factory Default Settings 119
Ethernet Configuration 119
Use Full Duplex 119
Allow Extended Cable Length 119
Serial Port Configuration 119
Control Port Baud Rate 119
Data Port Baud Rate 119
IP Parameters 119
IP Address 119
Subnet Mask 119
IP Gateway 119
Primary DNS Server 119
Secondary DNS Server 119
Alternate DNS Server 120
Host Name 120
Domain 120
Enable DHCP 120
TCP Parameters 120
HTTP Configuration Port: 120
Configuration Port: 120
Data Retrieval Port: 120
Echo on Data Retrieval Port: 120
TCP ECHO Service Port: 120
TCP CHARGEN Service Port: 120
Site and Data Collection Settings 120
Site Identification 120
End of Record Character 120
Data Collection Method 120
RS-232C Data Port at XXXX Baud 120
Generic Plain ASCII Text as TCP/IP Server on Port 2301 120
Avaya Session Layer Protocol (Definity RSP) on Port XXXX 120
Record Modifications 121
Add Line Numbers 121
Add Record/Block CRC 121
Add Local Date/Time 121
Short Date/Time Format 121

Command Sets 121
Enable MDR2000 Commands 121
Enable Omnitronix Commands 121
Enable WTI/PollCat Commands 121
Security Parameters 121
HTTP Configuration User Name 121
HTTP Configuration Password 121
Telnet Configuration User Name 121
Telnet Configuration Password 121
Data Retrieval User Name 121
Data Retrieval Password 121
SNTP (Time Server) Settings 121
Primary NTP Server 121
Secondary NTP Server 122
Time Zone 122
Automatically Adjust for Daylight Time 122
Sync every XX Hours 122
FTP Upload Settings 122
FTP Server 122
FTP Server Directory 122
Base File Name 122
File Extension 122
FTP Port 122
Upload Empty 122
Compressed 122
Automatic Upload 122
Delete Uploaded Records 122
Upload When XX% Full 122
Upload Interval 122
FTP User Name 122
FTP Password 123
TCP/IP Security Parameters 123
Network 1 123
Mask 1 123
Network 2-6 123
Network 2-6 123
Enable TCP/IP Filtering 123
Specifications 125
System Requirements 125
Hardware Requirements 125

Software Requirements 125
Operating Conditions 125
Technical Specifications 126
Connections 126
Power 126
Serial Ports 126
Network 126
Indicators 126
Front Panel 126
Rear Panel 127
Glossary 129
Index 139

Chapter 1

Introduction

This manual describes the operational characteristics of the TR-2100 Data Buffer. All aspects of the operational capability of the TR-2100 are covered including details for unit set-up, operation and troubleshooting.

In general, reference to this manual will only be required during initial installation and when programming application software to interface with the TR-2100. This programming information starts on page 91.

The TR-2100 has many options and parameters that can be adjusted and set to provide optimum performance in virtually any application. Many of these settings have default values that are suitable for most applications and a typical installation will only require a few key settings to be customized.

The TR-2100 Windows Configuration Program, described on page 15, is the preferred tool for setting up the TR-2100's configuration when the TR-2100 is physically accessible.

The TR-2100's built in WEB Server, described on page 51, is the preferred tool to use when configuring the unit and the TR-2100 is not physically accessible.

The Interactive Monitor can also be used for configuring the TR-2100. This can be done through a Telnet client or a terminal emulator through the TR-2100 Control Port. This is described on page 67.

Electrical, physical and environmental specifications are provided in the chapter Specifications on page 125.

Network and Modem Access

All functions, including data retrieval and device configuration, can be done using a Network, modem or local PC (at rates up to 115,200 baud). When the TR-2100 is installed in a TCP/IP environment, Telnet or the TR-2100's internal WEB server is used to access the command mode. Password protection prevents unauthorized access to the TR-2100. You can also dial-up an external modem connected to the TR-2100. Stored data can be reliably retrieved using a commercial data collection program, or a Telnet or serial port terminal emulation program.

High security

The TR-2100 can send data to an FTP server automatically at regular intervals. The TR-2100 uses FTP Passive mode and acts as a client. It is not possible to make a connection from an external source to the TR-2100 FTP client. When the TR-2100 connects to your FTP server as a client, using the FTP Automatic Upload feature, upload speed can approach 50,000 compressed records per minute over the Internet.

Programmable Upload Interval

The TR-2100 can be programmed to automatically upload data, using the FTP Automatic Upload feature, after a specific time interval, at a specific percent full level or both.

Non-volatile Flash Memory

The TR-2100 uses reliable flash memory to store data records, operating parameters and configuration information. This eliminates data loss due to depleted batteries. If power to the unit is interrupted or disconnected, stored data and parameters will be retained indefinitely. There are no jumpers or switches to set, no batteries to replace, nothing to service. There should never be a reason to remove the cover.

Fast and Convenient Firmware Updates

The latest version of the TR-2100 Windows Configuration Program can be downloaded from www.databuffers.com. This program contains the latest firmware version and will automatically offer to update your TR-2100 when it detects an older version of the firmware. The update takes about 30 seconds.

High Compression Storage

High Compression storage can almost triple the number of characters that can be stored. Based on the Nortel SL1 call record format, the 8 Meg TR-2100 can store over 320,000 records. Other record formats provide similar compression ratios.

Compatibility

The TR-2100 has a very powerful and complete set of commands. It also supports selected commands compatible with existing data buffers including the MDR-2000, the Omnitronix Data-Link and the WTI PollCat buffers.

Chapter 2

Overview

The purpose of this section is to provide a general description of the TR-2100 Data Buffer. Each of the features discussed in this section will be further described in later chapters of the manual.

The TR-2100 is a compact, highly versatile data collection device. It is designed for maintenance free operation with reliability features to ensure data integrity as well as low support and service costs.

The TR-2100 can be installed quickly. It requires a minimum of space and has no environmental requirements other than those normally found in the office or telephone equipment room.

Once in operation the TR-2100 will collect data, typically but not necessarily call detail records (CDR) from a PBX or other device, for later transmission and downstream processing.

It has no battery to be replaced because it uses flash memory for data storage.

The TR-2100 communicates with the data source via an RS-232C compatible port. Communications with downstream processing facilities is made possible by using another RS-232C port (the TR-2100 CONTROL PORT) via a direct connection or a modem, or via its on-board Ethernet Port. The TR-2100 serial ports can be setup to communicate at speeds from 1200 to 115,200 Baud, but a system is limited by the capability of the downstream facilities to accept the data at the higher speeds, the modem equipment and the quality of the transmission lines.

To ensure data integrity, the data transmitted to the downstream processing unit can be encapsulated in a data packet. The packet contains byte count and checksum information to provide error detection capability. If the downstream collection software detects an error it may request that the TR-2100 send the packet again. This feature is important in ensuring the integrity of the downstream report processing.

While the TR-2100 is transferring data downstream it continues to collect and process information from the Data Source. This facility means that real-time data collection from the TR-2100 is practical.

Commands by the downstream processing unit to the TR-2100 or by technicians for remote diagnosis are very simple. Commands exist in two command structures, computer-to-computer and interactive.

By using groups of computer-to-computer commands the TR-2100 will perform all of the functions necessary for automatic data collection. These commands provide the functionality listed below.

Communications Commands

- Send the current record to the downstream processing system.
- Advance to the next record.
- Clear all of the previously transmitted records. This command makes room for new records.
- Reset to the beginning of the buffer. This command helps recover records lost due to downstream processing failures.
- Doorbell. This command returns a simple 'Hello' response to ensure that a connection to the TR-2100 has been made.
- Maintenance/Support Commands.
- Pass data from the DATA PORT to the CONTROL port for dynamic monitoring of PBX activity. Data is still processed and retained by the TR-2100.
- Commands to reset the entire TR-2100, or the TR-2100 buffer memory.
- It supports the test and diagnostic Internet Protocols PING, ECHO and CHARGEN.

Internet Protocol Features

- FTP Protocol used for uploading data to an FTP server.
- HTTP Protocol used for configuration through a WEB Browser.
- Telnet Protocol user for configuration.
- Telnet Protocol for data record retrieval.
- NetBIOS Name Resolution Protocol.
- DHCP Configuration.
- RARP, Reverse Address Resolution Protocol.
- Ethernet Statistics are collected and available.
- Serial Port and Buffer Status Statistics are collected and available.
- PING, ECHO and CHARGEN protocols for network testing and diagnostics.

Buffer Configuration Options

There are several methods of configuring the TR-2100. They are all described in the following chapters.

TR-2100 Windows Configuration Program

The quickest and easiest method, if there is direct physical access to the TR-2100's serial port, is the Telcom Research TR-2100 Windows Configuration Program. A free download of the latest version can be uploaded from our WEB Site www.databuffers.com. This program is described starting on page 15.

TR-2100 WEB Interface

Another quick and easy method to configure the TR-2100, that can be used remotely or locally, is the TR-2100 WEB Interface. The host name of your TR-2100, which is provided on the label on the bottom of the unit, is required if this method is going to be used and theTR-2100 must be accessible via your network or the Internet. This method of initial setup is described on page 51.

Configuration with an RS-232 terminal emulation program

The TR-2100 contains an Interactive Monitor that lets you set all of its configuration options with a RS-232 terminal emulation program on a computer, as well as a real terminal. This method of setup is described on page 67.

Telnet Configuration

The Interactive Monitor is also available over its network connection with a Telnet connection on a special TCP port (default 9999). This port as well as the ports used for HTTP, PING, ECHO and CHARGEN can be changed. This method of setup is described starting on page 67.

All network connections support User Name and Password configuration. It is strongly recommended that these security features be used.

Reverse ARP Configuration

This method is the most difficult and should rarely if ever be required. We have included it for completeness. This method of setup is described on page 83.

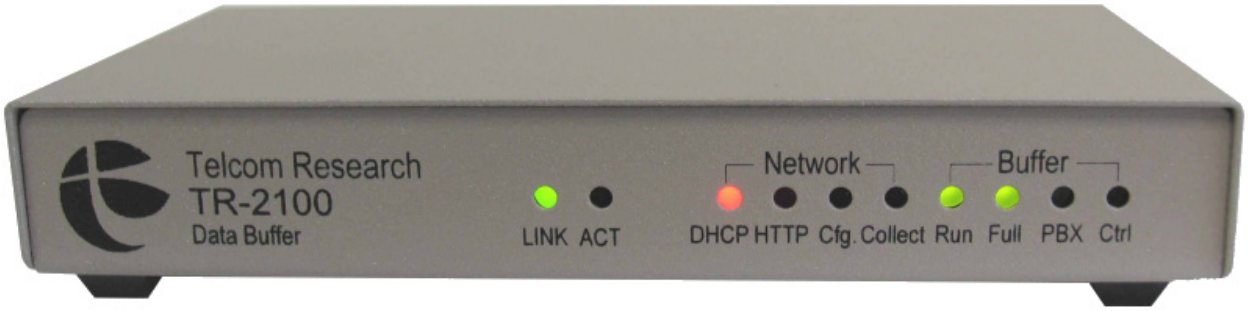


Figure 1 Front Panel

Front Panel Indicators

- **LINK** This is a green LED indicating that the Ethernet circuit is detecting the presence of valid link pulses.
- **ACT** This is a red LED that indicates activity on the Ethernet interface.
- **DHCP** This is a red LED, which when illuminated, indicates that the TR-2100 has received valid IP configuration data from a DHCP server.
- **HTTP** This LED illuminates Red during WEB Configuration as it processes each HTTP protocol request and response.
- **Cfg** A Red LED indicating that the Interactive Monitor is connected through the Telnet Interactive Monitor Port.

- **Collect** A Red LED that illuminates when a Data Retrieval Telnet session is open or an FTP connection is uploading data.
- **Run** This Red/Green LED is red during start-up or during a master reset. It turns to green when the TR-2100 begins normal operation.
- **Full** Please refer to the paragraph Buffer State LED Interpretation on page 13 for a full explanation of this Red/Green LED indicator.
- **PBX** This Red/Green LED indicates activity on the DATA Serial Port. It flashes green when the port is receiving and red when it is transmitting.
- **Ctrl** Red/Green LED This Red/Green LED indicates activity on the Control serial port. It flashes green when the port is receiving and red when it is transmitting.

Figure 2 Rear Panel

Rear Panel Indicators

These are duplicates of two of the Front Panel network Indicators and are supplied as a convenience.

- **LINK** This is a green LED indicating that the Ethernet circuit is detecting the presence of valid link pulses.
- **ACT** This is a red LED that indicates activity on the Ethernet interface.

Rear Panel Connectors

There are four connectors on the rear panel of the TR-2100.

- **POWER INPUT** This is a 9mm long, 5.5 mm diameter coaxial power connector. The allowed input voltage is 8 to 16 volts AC or DC. The maximum current consumption is 200 ma.
- **CONTROL** This is a 9-pin miniature male D connector wired as Data Terminal Equipment. Please see the tables on page 9 for details of the pin assignments.
- **DATA/PBX** This is a 9-pin miniature male D connector wired as Data Terminal Equipment. Please see the table on page 9 for details of the pin assignments.
- **ETHERNET** This is an RJ-45 connector. Please see the table on page 11 for details of the pin assignments.

Supplied Accessories

Figure 3 Supplied Accessories

An AC adapter and a Null Modem cable are supplied with the TR-2100

Chapter 3

Installation

Installation of the TR-2100 is straight forward. There are 4 external connections and in some cases only 3. The following paragraphs describe each of these connections in detail.

Power Supply

The power supply that comes with the TR-2100 is shown in the photograph Supplied Accessories on page 7. This power supply has an output of 9 Volts DC at 500 milliamperes. Any similar power supply with an output voltage in the range of 8 to 16 volts AC or DC and a current capability of 250 milliamperes or more may be used.

Connecting Directly to a Computer Serial Port

The TR-2100 can be connected to a computer through a serial port on the computer. The PC COM port and the TR-2100 CONTROL PORT should be connected with a NULL MODEM Cable (supplied with the TR-2100) or a cable used for direct serial connection between two Windows computers (available from most computer stores).

This connector is wired as Data Terminal Equipment as shown in Table 1 - 9-pin null modem cabling wiring, below.

TR-2100 Control Port connector	Computer serial port connector	Signal
3	2	Transmit Data
2	3	Receive Data
7	8	Request To Send
8	7	Clear To Send
6, 1	4	Data Set Ready and Carrier Detect
5	5	Signal Ground
4	6, 1	Data Terminal Ready

Table 1 - 9-pin null modem cabling wiring

Note: Although the 'hand shake lines' Request to send, Clear to send, Data terminal ready, Data set ready and carrier detect are shown above, the TR-2100 does not require them but the PC may require them. The TR-2100 only requires Signal ground, Transmit data and Receive data.

TR-2100 9 pin Control Port connector	25 pin Modem serial port connector	Signal Name
3	2	Transmit Data
2	3	Receive Data
7	4	Request To Send
8	5	Clear To Send
6	6	Data Set Ready
5	7	Signal Ground
1	8	Carrier Detect
4	20	Data Terminal Ready

Table 2 - 9 pin to 25 pin Direct Modem Wiring

Connecting to the Data Source

The TR-2100 can be connected to a data source such as a PBX with the 9-pin RS-232C connector labelled PBX on the rear panel. This connector is wired as Data Terminal Equipment as shown in Table 3 - 9-pin Port Wiring, below. The cable for this connector is not supplied.

TR-2100 serial port connectors	Signal
1	Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Signal Ground
6	Data Set Ready
7	Request To Send
8	Clear To Send
9	Ring Indicator

Table 3 - 9-pin Port Wiring

Ethernet Connection

Connect your TR-2100 to your network with the supplied Ethernet cable using the RJ-45 connector labelled ‘Ethernet’ on the rear of the unit. The TR-2100 Ethernet Port runs at 10Mb/sec so be sure that the hub or switch connecting it to the network can operate at this speed. If the unit is properly connected to the network the green LINK indicator next to the RJ-45 will be illuminated and the green LINK indicator on the front panel will also be illuminated.

The table below shows the pins and corresponding signals for the RJ-45 connector.

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Table 4 - Ethernet Connector Wiring

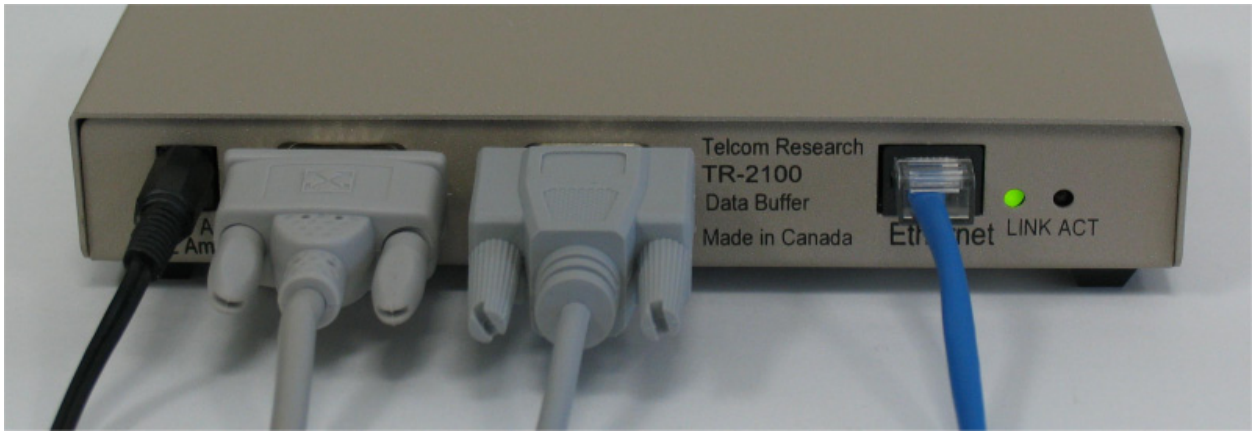


Figure 4 Rear Panel Connections

Chapter 4

Data Collection

The purpose of this section is to describe the data collection process as well as the contents and format of the data used by the TR-2100.

CDR Data Collection

This section describes the details of record collection by the TR-2100. All data is collected from the Data Source over a 1200 to 115,200 Baud, RS-232C compatible port. For collection from a telephone PBX system this is generally achieved by requesting the PBX supplier to enable the port on the PBX. In general, the PBX CDR port must be configured for a standalone hardcopy terminal. That is how the TR-2100 looks to the PBX.

Input/Output Records

Almost all PBXs are supported by the TR-2100. Each record sent from the PBX is terminated by, or preceded by, a carriage-return/linefeed pair. All control characters (those with ASCII codes below 32) are ignored except the carriage-return that is required as the end-of-record indicator.

The TR-2100 can also collect data from any other device that supplies records terminated by a carriage-return

Buffer State LED Interpretation

The ‘Full’ LED in the ‘Buffer’ group on the front panel indicates the state of the available and used buffer capacity. See the table on the following page for a description of how to interpret this LED’s flashing pattern.

Buffer Percent Full	Full LED Red State	Full LED Green State
Empty	Off	On Solid
Less than 10%	1 Flash	9 Flashes
10% to 19%	2 Flashes	8 Flashes
20% to 29%	3 Flashes	7 Flashes
30% to 39%	4 Flashes	6 Flashes
40% to 49%	5 Flashes	5 Flashes
50% to 59%	6 Flashes	4 Flashes
60% to 69%	7 Flashes	3 Flashes
70% to 79%	8 Flashes	2 Flashes
80% to 89%	9 Flashes	1 Flash
90% to Less than 100%	10 Flashes	0 Flashes
Full	On Solid	Off

Table 5 - Buffer State LED Interpretation

Chapter 5

TR-2100 Windows Configuration Program

This is a PC program that controls and configures the TR-2100 through a PC COM port. The TR-2100 and the computer should be connected as described in the Installation chapter beginning on page 9.

Note: Although the TR-2100 Configuration Utility can be used to configure all the network settings, it does not require the network to be connected in order to do this.

Connecting to the PC

The TR-2100 Configuration Utility can use any serial port available on the PC. When you start the program it will attempt to connect to the COM port with the baud rate used the last time it was run. The result of this attempt is displayed in the window below the drop-down list labelled 'Current Baud Rate'. If it is green and says 'Connected' as shown, the attempt was successful. If the window is red and says 'Not Connected', clicking on the 'Find Me!' button will start a discovery sequence where every COM port on the PC will be scanned at every baud rate looking for the TR-2100. This process only takes a few seconds on the average PC. Upon success the CONTROL PORT display will show the new COM Port and baud rate. The window below the drop-down list labelled 'Current Baud Rate' will be green and say 'Connected' as shown below.

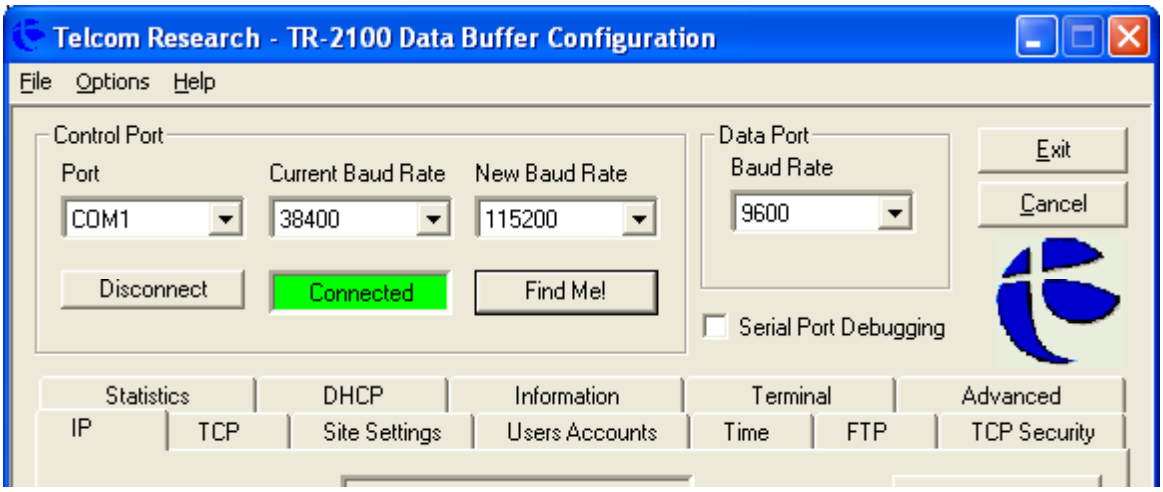


Figure 5 Communications Port Settings

Menu Options

File Menu

The File Menu allows you to load and save configuration settings.

Select Configuration File

This item brings up the standard Windows File Open dialog. It can be used to select an existing or a new configuration file. See the description of Get Settings on page 20 for more details.

Save Configuration File

This saves the currently displayed settings to the file named in the Status Bar at the bottom of the display. There is no prompt and the file will be immediately updated to reflect the currently displayed settings. See the description of Save Settings on page 20 for more details.

Save Configuration File As

This item brings up the standard Windows File Open dialog. It lets you save the currently displayed settings to a new or existing file of your choice. The name of the file will appear in the Status Bar at the bottom of the display. This file will then be used for subsequent Save Configuration File menu commands and Save Settings button commands (described on page 20).

Recently Used File List

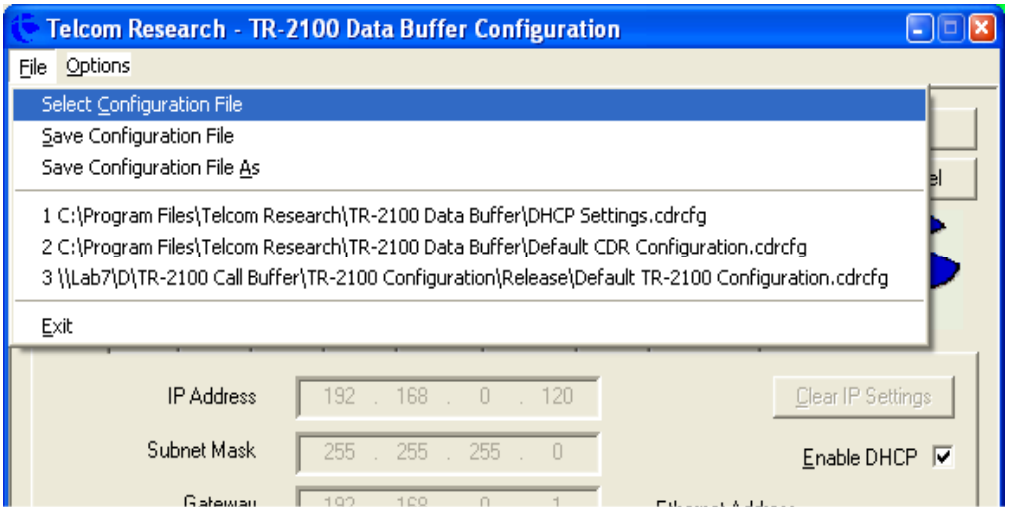


Figure 6 File Menu

This is a list of the most recently used configuration files. It is a quick and convenient way to reload a collection of standard settings that you want to use again.

Options Menu

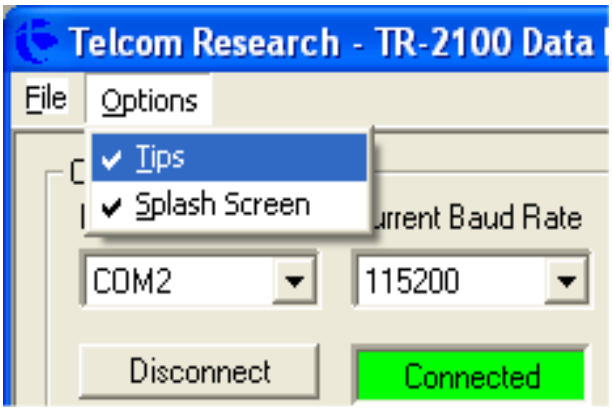


Figure 7 Options Menu

The following features of the TR-2100 Windows Configuration Program can be enabled and disabled through the options menu.

Tips

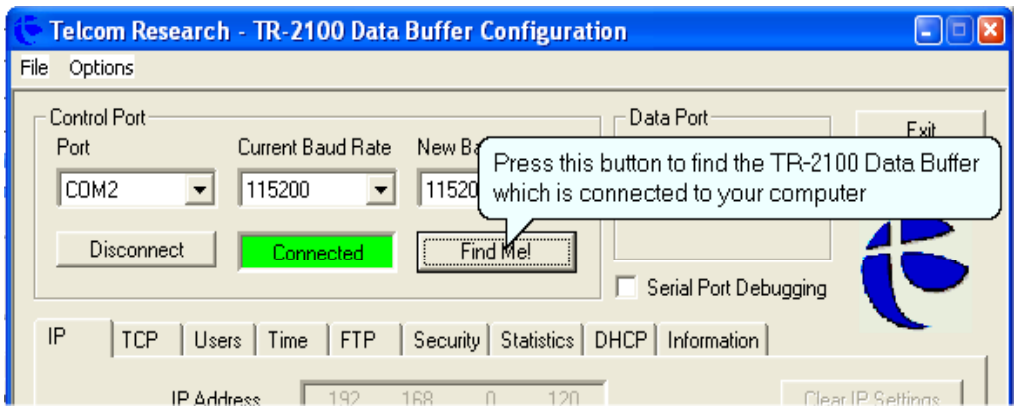


Figure 8 The Tips Feature

This feature provides help on all the controls and settings in the TR-2100 Windows Configuration Program screens.

Splash Screen

Removing the check mark under Options/Splash Screen disables the start up splash screen.

Main Controls and Indicators

Control Port Group

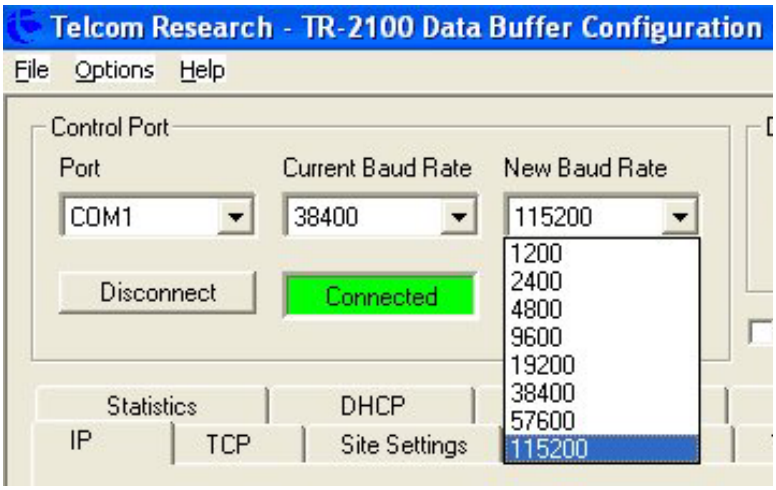


Figure 9 Control Port Group

This section describes the main controls and indicators belonging to the '**Control Port**' group. These are located at the top of the main window on the left side.

Port

This window shows the PC Serial Port being used to communicate with the TR-2100. It has a drop-down list that displays all the serial ports on the PC.

Current Baud Rate

This window displays the baud rate currently being used to communicate with the TR-2100. It has a drop-down list that displays all the available baud rates for the selected serial port on the PC.

When you make a selection with this control the results are immediately indicated by the 'Connected - Not Connected' window described below.

New Baud Rate

This window displays the baud rate that will be set for the PC and the TR-2100 when the 'Send Settings' button (described below) is pressed. Also see Communications Port Settings on page 15.

Disconnect - Connect

This button connects and disconnects the PC Serial Port connection to the TR-2100. The labelling of the button changes depending on the current Serial Port connection state.

Connected - Not Connected

This indicator appears green with the word '**Connected'** displayed when the PC Serial Port connection to the TR-2100 is 'Open'. It is red and displays Not Connected when the connection is 'Closed'.

Find Me!

Pressing this button starts a search sequence to check all the available serial ports on the PC at all available baud rates in an attempt to find a connected TR-2100. During the search, the label on the button changes to 'STOP!' and the 'Connected' window turns to blue and says 'Connection'. Pressing the button at this point will terminate the search. When the program finds a TR-2100 the 'Connected' window turns green and the search stops. If no TR-2100 is found or the search is stopped the 'Connected' window turns red.

Data Port Group

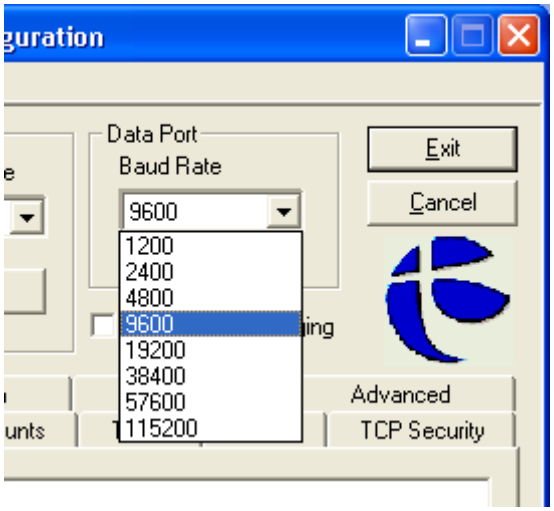


Figure 10 Data/PBX Port

This section describes the main controls and indicators belonging to the '**Data Port**' group. These are located at the top of the main window on the right side.

Baud Rate

This window displays the baud rate set for the TR-2100 Data PBX/Port. It is sent to the TR-2100 when the 'Send Settings' button (described below) is pressed.

Ungrouped Controls and Indicators

Exit

This control stops the TR-2100 Windows Configuration Program. It saves the TR-2100 settings to the file named in the status window at the bottom of the display (described below). These settings are those programmed in the TR-2100 Windows Configuration Program and may not be the same as the settings of the connected TR-2100.

Cancel

This control stops the TR-2100 Windows Configuration Program. It does not save any changes.

Serial Port Debugging

If this checkbox is selected, all data received or transmitted by the TR-2100 CONTROL PORT is to be transmitted via the DATA PORT. Any data transmitted to the TR-2100 DATA PORT, while in this mode, will still be collected properly. This feature can be used as an aid when developing software for the TR-2100. It allows a developer to monitor communications between the TR-2100 and the program being developed. It should not be used in normal operation.

Main Controls and Indicators, Bottom of Page

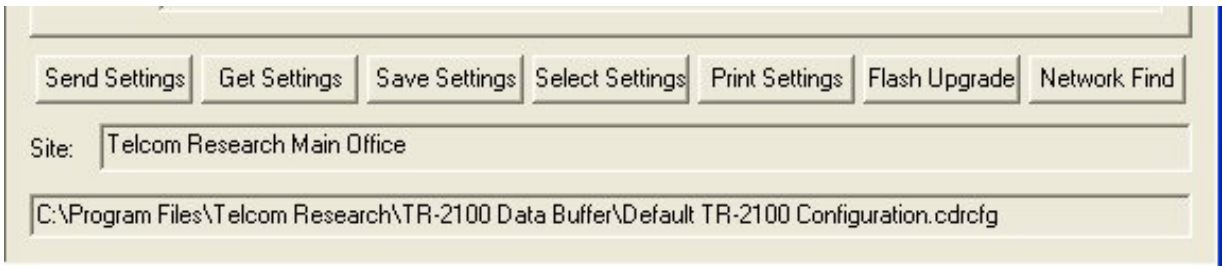


Figure 11 Main Controls and Indicators Lower Section

Send Settings

Pressing this button sends all the settings in the Configuration Program to the TR-2100. The Status Bar just below this button shows the progress of the transfer. This control is only available when the ‘Connected - Not Connected’ indicator is green.

Get Settings

Pressing this button retrieves all the settings from the connected TR-2100 and updates all the displayed settings. The Status Bar just below this button shows the progress of the transfer. This control is only available when the ‘Connected - Not Connected’ indicator is green.

Save Settings

This control saves the settings from the TR-2100 Windows Configuration Program to the file named in the status window at the bottom of the display (described below). To save settings from the connected TR-2100, press ‘Get Settings’ before using this button.

Select Settings

Pressing this button retrieves all the settings from the file indicated in the Status Bar (described below) and updates all the displayed settings.

Print Settings

This will bring up the standard Windows Print dialog and allow you to print a single page containing all the current information and settings in the connected TR-2100. This information comes directly from the connected TR-2100 and not from the information displayed on the screen. This control is only available when the 'Connected - Not Connected' indicator is green.

Flash Update

This opens the Flash Update control. The TR-2100 configuration program contains the latest version of the TR-2100 firmware. This control enables you to update the firmware in your TR-2100. It takes about 30 seconds. Please see the chapter Flash Program Memory Update on page 43 for details.

Network Finder

This starts a program that finds all the TR-2100s attached to your local Ethernet. It also allows you to connect to and configure them regardless of their current IP address settings. Please see the chapter Network Finder on page 47 for details.

Status Bar

The status bar at the bottom of the display serves 2 functions. The majority of the time it displays the name of the configuration file that was most recently loaded or saved. The displayed configuration file is the one that will be used to save the settings when the Exit button (page 19) is pressed. The second function is to display a progress bar showing the status of uploading TR-2100 settings.

Ethernet Connection

Physically connect the TR-2100 to your network as described in the Installation chapter on page 9.

Setting the IP Parameters

You will need to obtain an IP address and network mask (and possibly a gateway IP Address) from your network administrator before you can set up your TR-2100 Ethernet Port without using DHCP.

Automatically Setting the IP Parameters using DHCP

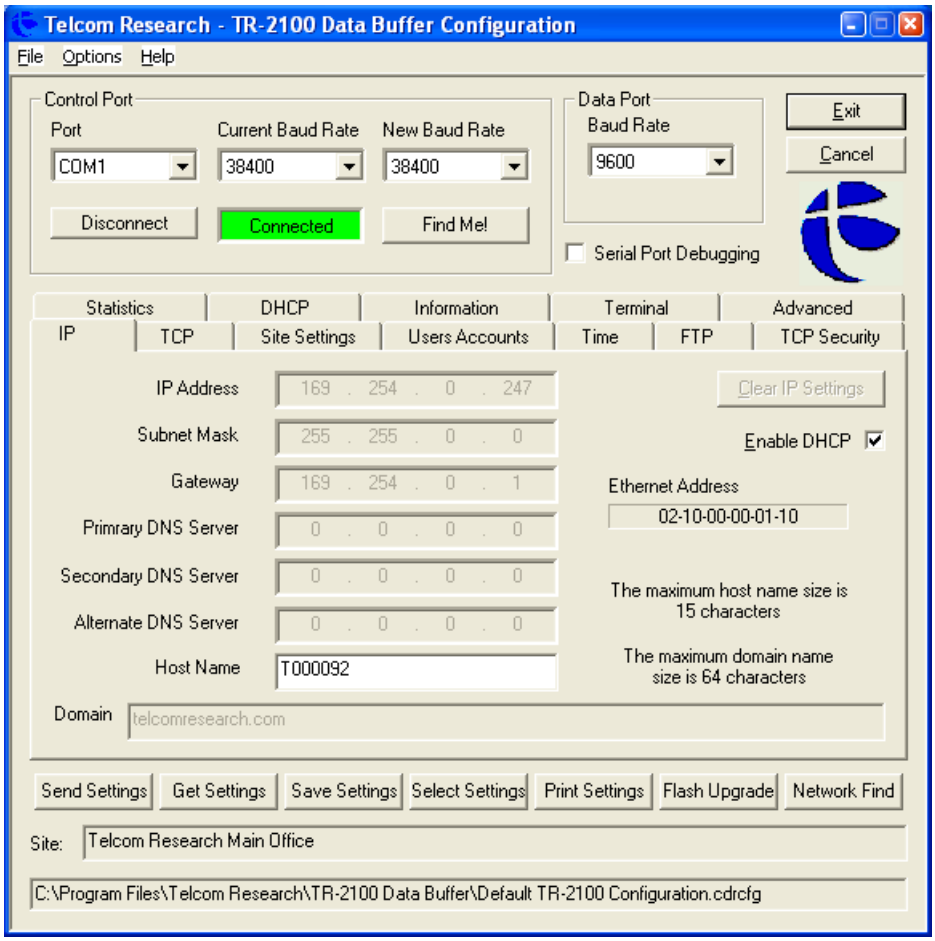


Figure 12 DHCP Settings

If there is a DHCP server on your network then you can use this protocol to configure the IP network settings for the TR-2100. The DHCP server will supply all the required IP parameters except the 'Host Name', which must be unique in your domain. Most DHCP servers in use today will automatically create DNS foreword (A records) and reverse (PTR records) entries in a domain's DNS Server.

Connect the TR-2100 to the network with the supplied Ethernet cable as described in the Installation chapter on page 9. The LINK light should be green if the TR-2100 can see your network. Referring to the figure above, perform the following steps:

1. Check the box labelled **Enable DHCP**.
2. Click the '**Send Settings**' Button.

After a few seconds the DHCP indicator should light red, indicating that the IP parameters have been set. You can now click on the DHCP tab and view the settings obtained from the DHCP server.

If you are on a Windows Network you should be able to use the Ping command on the PC to verify that the TR-2100 is on the network. This command is also available on Unix

and Linux systems and works the same way. At a command prompt (DOS prompt in Windows 98 or earlier) enter the following:

```
C:\Documents and Settings\Your Name>ping T713572
```

You should see a response similar to:

```
Pinging T713572.home.telcomresearch.com [192.168.0.129] with 32 bytes of data:

Reply from 192.168.0.129: bytes=32 time<10ms TTL=64
Reply from 192.168.0.129: bytes=32 time<10ms TTL=64
Reply from 192.168.0.129: bytes=32 time<10ms TTL=64
Reply from 192.168.0.129: bytes=32 time<10ms TTL=64

Ping statistics for 192.168.0.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Setting the IP Parameters Manually

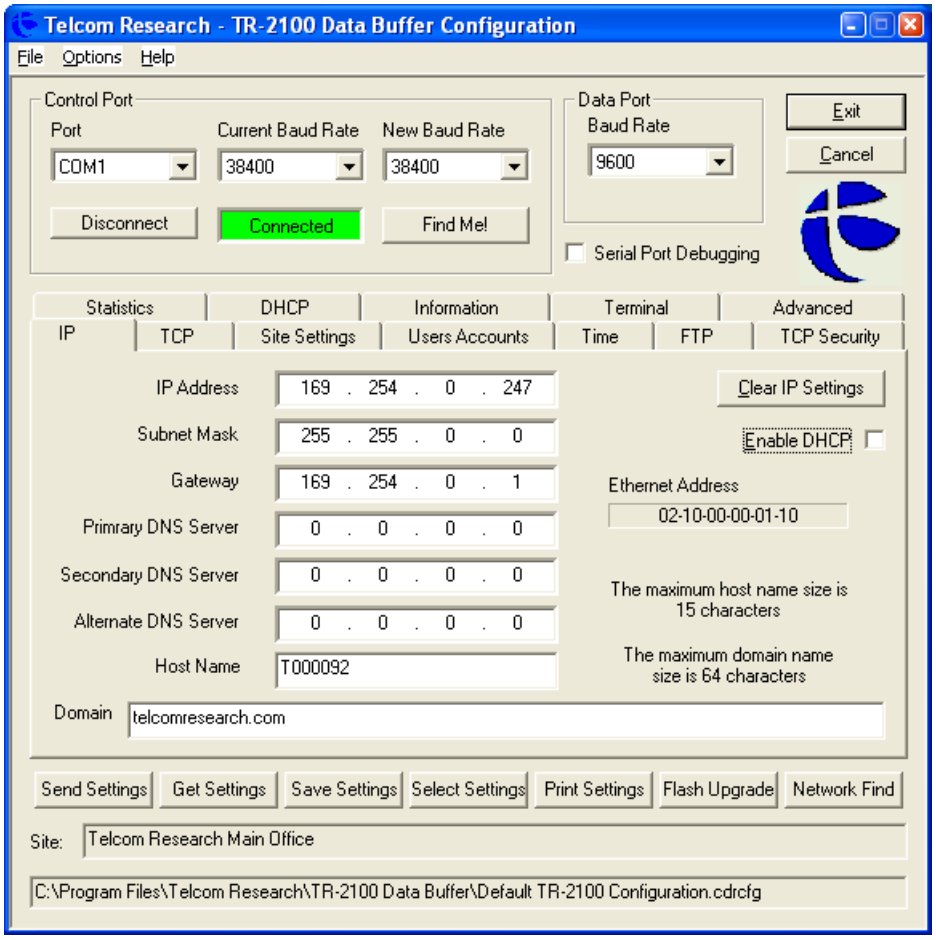


Figure 13 IP Settings

To set the IP parameters, clear the '**Enable DHCP**' check box and manually enter your information in the following fields:

- **IP Address**: The Internet IPv4 address you want to assign to this TR-2100.

Note: After entering the rightmost IP Address field, press the TAB key. As a time saving convenience the TR-2100 will calculate standard values for the Subnet Mask and the network portion of the Gateway address and position the cursor in the first field of the local network portion of the Gateway address. Check that the Subnet Mask is acceptable and fill in the local network portion of the Gateway Address.

- **Subnet Mask**: The Subnet Mask required for correct operation on your network. If it is set to 0.0.0.0 then all traffic is local. No communication is possible through any router on the network. See Non-Contiguous Subnet Bits on page 36 for more information on subnet masks.
- **Default Gateway**: The Default Gateway on your network. The Default Gateway must be on the same subnet as your IP Address otherwise it will not be accepted.
- **Primary DNS Server**: The first DNS Server to be queried during name resolution.
- **Secondary DNS Server**: The second DNS Server to be queried during name resolution. This is optional and may be set to all zeroes or blank.
- **Alternate DNS Server**: The third DNS Server to be queried during name resolution. This is optional and may be set to all zeroes or blank.
- **Host Name**: This is the name that the TR-2100 will be known by on the network. It must be unique in the Domain specified below.
- **Domain**: This is the domain to which the TR-2100 belongs. This is used with the Host Name to form the Fully Qualified Domain Name used to find the TR-2100 on the intranet or on the Internet.

*Note: The Host name and the Domain Name must follow the rules for ARPANET host names. They must start with a letter, end with a letter or digit, and have as interior characters only letters, digits, and hyphen. The Domain Name must contain the period character '.' to separate sub domains from each other and the root domain as in **T03031.home.telcomresearch.com**. This is referred to as a fully qualified domain name. It is not case sensitive so **T03031.home.telcomresearch.com** and **t03031.hoME.TelcomRESEARCH.COM** refer to the same TR-2100.*

Reserved IP Addresses For Private Networks

The following addresses are for local use and cannot be routed on the Internet.

- 10.0.0.0 - 10.255.255.255
- 169.254.0.0 - 169.254.255.255
- 172.16.0.0 - 172.31.255.255
- 192.168.0.0 - 192.168.255.255

Setting the TCP Parameters

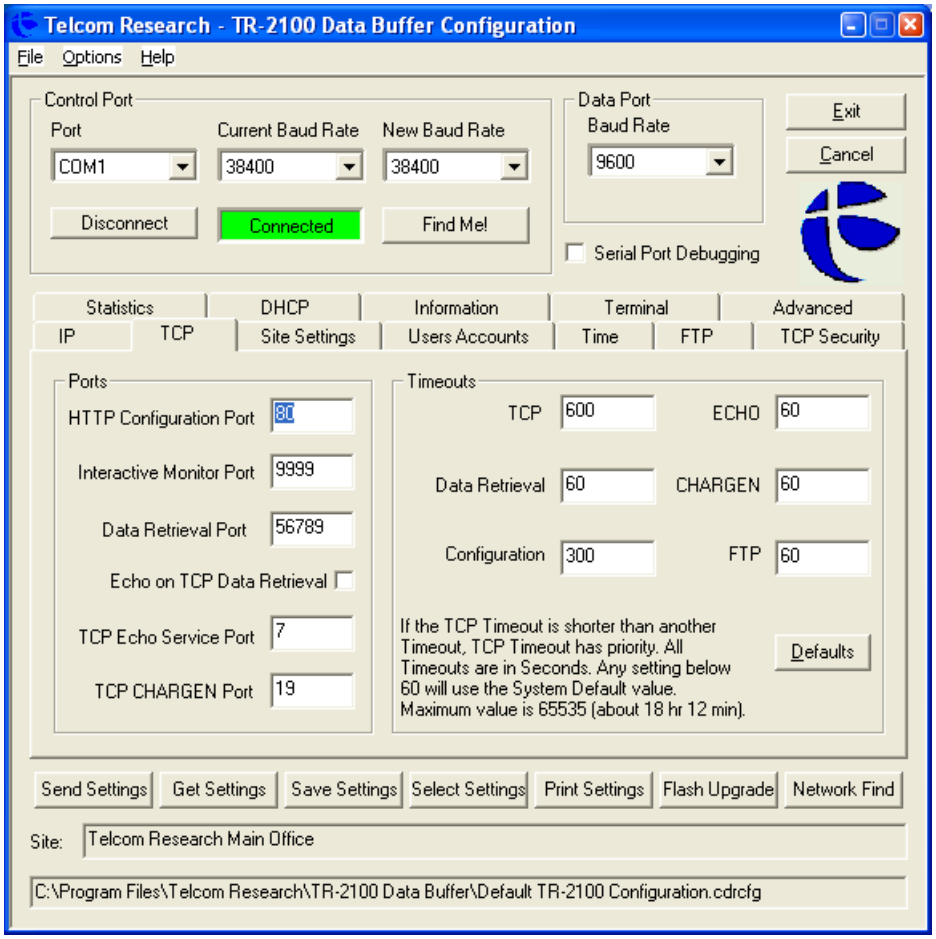


Figure 14 TCP Settings

The TCP parameters consist of various ports used to communicate with the TR-2100 and timeout values associated with open connections on these ports.

WARNING! All port numbers must be unique. No port may use a number that is used by another port.

Note: If TCP Timeout is shorter than Another Timeout, TCP Timeout has priority. Any setting below 60 will use the system default value. Maximum value is 65535 (about 18 hr 12 min).

Setting the TCP Ports

HTTP Configuration Port: This is the port that is used for configuration with a WEB Browser. Default value is **80**. Port 80 is the default HTTP port on the Internet. We recommend that you change it as a security measure.

Interactive Monitor Port: This is the port that is used for configuration with the Interactive Monitor using a Telnet Client. Default value is **9999**.

Data Retrieval Port: This is the port that is used for collecting data records from the TR-2100 using the Telnet protocol. Default value is **56789**.

Echo on TCP Data Retrieval: This determines whether characters transmitted on the Data Retrieval Port are echoed back to the sender. Default value is **DISABLED**.

TCP Echo Service Port: This is the port that is used for the TCP Echo service. This is a testing and diagnostic protocol. Default value is **7**.

TCP Chargen Port: This is the port that is used for the TCP CHARGEN service. This is a testing and diagnostic protocol. Default value is **19**.

Setting the TCP Timeouts

These settings determine how long a connection will be kept open with no communications activity. If there is no activity for a period equal to the timeout setting, the connection will be closed by the TR-2100. Be aware that the other end of the connection may have a shorter timeout than the TR-2100.

- **TCP**: Default value is 600 seconds.
- **Data Retrieval Port**: Default value is 300 seconds
- **Configuration Port**: Default value is 300 seconds. This is the timeout for the Interactive Monitor. Please note that the Interactive Monitor also uses this timeout when you are connected through the serial port.
- **ECHO**: Default value is 60 seconds.
- **CHARGEN**: Default value is 60 seconds.
- **FTP**: Default value is 60 seconds

Site and Data Collection Settings

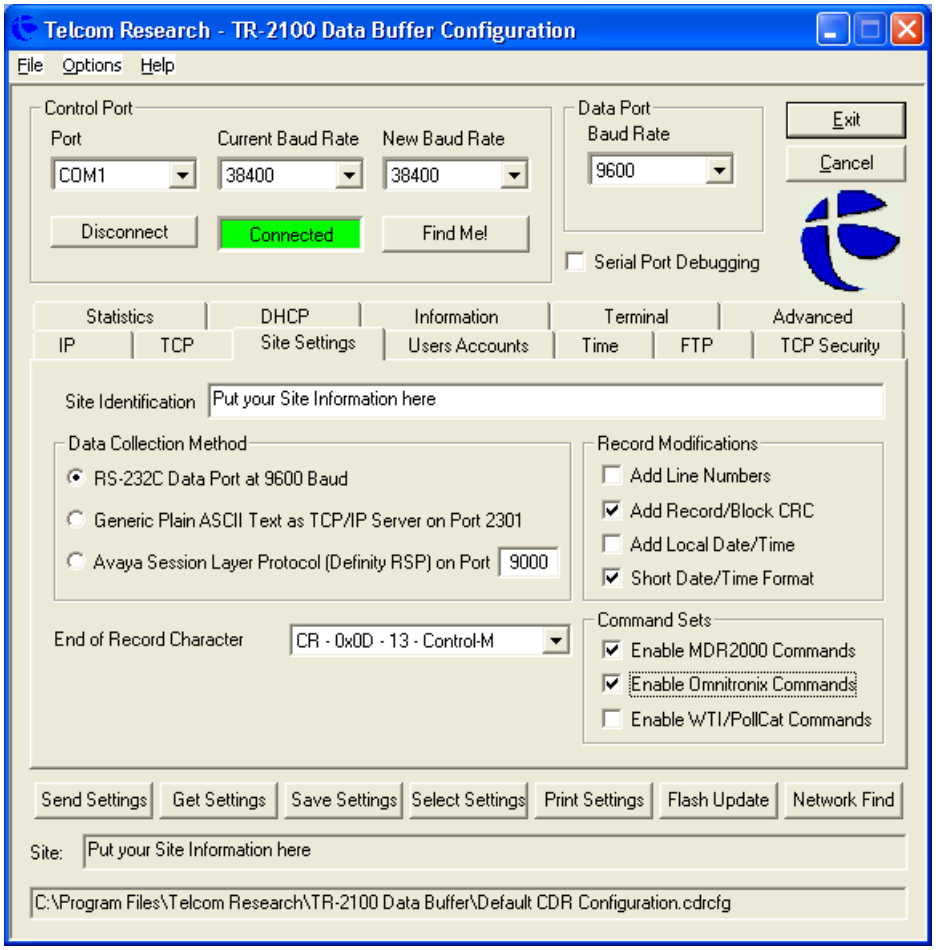


Figure 15 Site and Collection

This page configures the site identification message and the data collection policies. It features the following settings:

Site Identification

This is a message that will identify a particular TR-2100 installation. It shows up in several places (WEB configuration, this program, etc.) to help you verify that you are working on the correct TR-2100. The message can be up to 64 characters long.

End of Record Character

This is the character that the TR-2100 recognizes as marking the end of a record. The default value is a Carriage Return (CR - 0x0D - 13 - Control-M). Another common selection is a Line Feed (LF - 0x0A - 10 - Control-J). Both of these are treated as special cases in the following way. During data collection all control characters (ASCII valued below 32) are discarded before the records are compressed stored. During data retrieval the records are expanded and the End of Record Character is added back. If the End of Record Character is either a Carriage Return or a Line Feed the combination of a Carriage Return followed by a Line Feed

is added to the record. Otherwise only a single character (the End of Record Character) is added to the record.

Data Collection Method

This selects the method that the TR-2100 will be used to collect data. All non-printing characters are discarded before saving the data. The choices are:

RS-232C Data Port at XXXX Baud

Data will be collected through the RS-232 serial port at the indicated baud rate. The baud rate displayed is set with the Data Port Group baud rate control.

Generic Plain ASCII Text as TCP/IP Server on Port 2301

This is a TCP/IP protocol based on Telnet. The PBX operates as a client connecting to the TR-2100 acting as a server on TCP port 2301. The PBX then delivers call records in plain text format.

Avaya Session Layer Protocol (Definity RSP) on Port XXXX

This is a protocol used by Avaya on their Definity PBX switches. The Session Layer Protocol is used to guarantee the delivery of data from end to end, without duplication, over Transmission Control Protocol/Internet Protocol (TCP/IP) sockets. TCP/IP sockets are well known to provide best effort delivery of data over a network. The default TCP port used is 9000. The TR-2100 allows you to change this port. If you do so it must also be changed in the Avaya PBX.

Record Modifications

These are optional modifications that can be applied to the collected records either during collection or during retrieval.

Add Line Numbers

When this box is checked a six-digit number will be inserted at the beginning of all records retrieved. This means that the numbers are added when the records are output from the TR-2100. The line number will be a six-digit number with leading zeros.

Add Record/Block CRC

This adds a 2-byte cyclic redundancy check (CRC) to the end of each block or record as it is retrieved. These are not printable characters. They are binary 8 bit values with the high byte first.

Add Local Date/Time

When enabled, a date and time will be inserted at the beginning of each record collected. This is stored with the record.

Short Date/Time Format

Selects between the short and long form of the Date/Time stamp described above. The short format lists Month, Date, Hour and Minute (mm/dd hh:mm); the long format lists Month, Date, Year, Hour, Minute, and Second (mm/dd/yyyy hh:mm:ss).

Command Sets

This lets you select which command sets the TR-2100 will recognize..

Enable MDR2000 Commands

When checked this will enable recognition of the MDR-2000 compatible commands. If it is not checked and the TR-2100 receives an MDR-2000 command the following message is sent:
”The MDR-2000 command set is not enabled”

Enable Omnitronix Commands

When checked this will enable recognition of the Omnitronix compatible commands. If it is not checked and the TR-2100 receives an Omnitronix command the following message is sent:
”The Omnitronix command set is not enabled”

Enable WTI/PollCat Commands

When checked this will enable recognition of the WTI/PollCat compatible commands. If it is not checked and the TR-2100 receives a WTI/PollCat command the following message is sent:
”The WTI/PollCat command set is not enabled”

Setting the Users Accounts Security Parameters

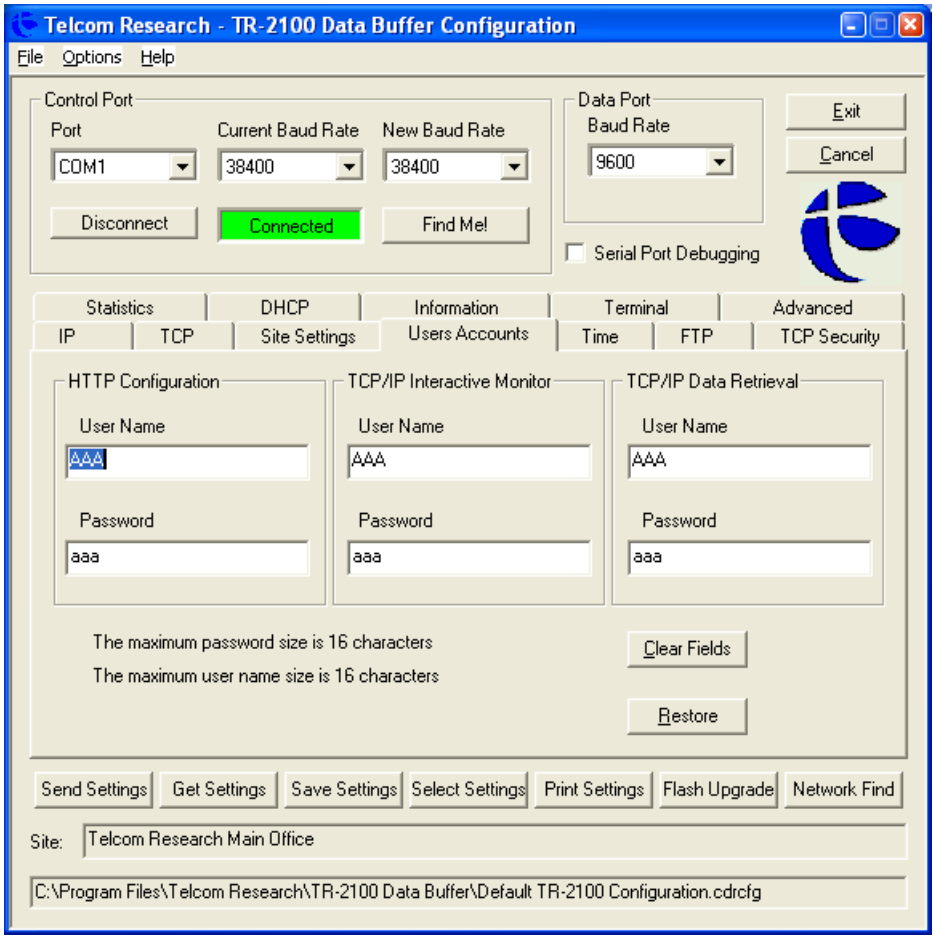


Figure 16 Users Security Settings

All Internet connections to the TR-2100 can be configured to require password authentication. We strongly advise using passwords to restrict access to the TR-2100. User names and passwords may be 1 to 16 characters long. If the user name or the password field is blank then no authentication is performed and the user will not be presented with a logon request. The password field is case sensitive but the name field is not.

SNTP (Time Server) Settings

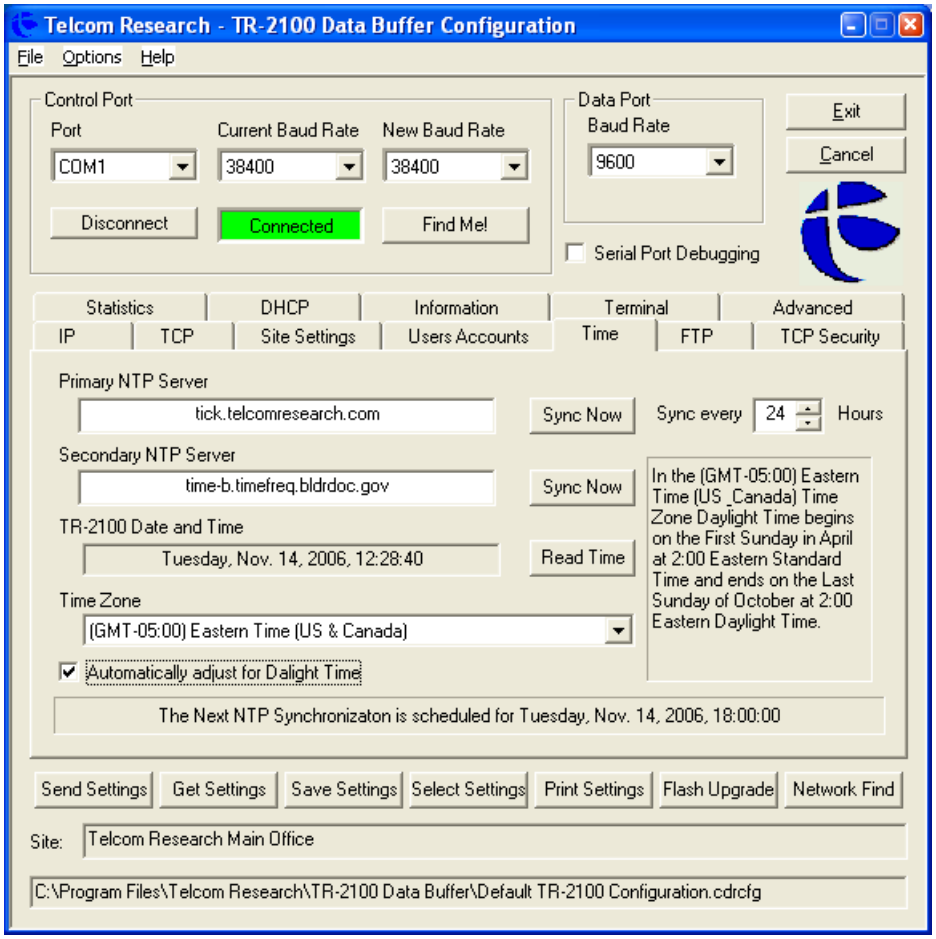


Figure 17 SNTP (Time Server) Settings

Network Time Protocol (NTP) is a protocol designed to synchronize the clocks of computers over a network. The TR-2100's internal clock uses NTP to synchronize its time at regular intervals to an NTP server on the Internet or a local intranet.

NTP servers on the Internet are organized in hierarchical configurations with the top level being a National Atomic Time Standard.

There is no other provision for setting the TR-2100's internal clock.

Primary NTP Server

This is configured as either the IP address or the fully qualified domain name of the desired NTP server. The factory default setting is **tick.telcomresearch.com.** To use a fully qualified domain name you must set one or more DNS entries on the IP Configuration page. If not you must only use an IP address.

Lists of publicly accessible timeservers can be found at:

http://ntp.isc.org/bin/view/Servers/WebHome

http://support.microsoft.com

http://old.cpsc.ucalgary.ca/Help/time

Secondary NTP Server

This is set to either the IP address or the fully qualified domain name of a backup NTP server. It is optional and may be left blank if you feel that the Primary NTP Server is very reliable. The default value is time-b.timefreq.bldrdoc.gov

Time Zone

This selects the Standard Time offset of your region from Coordinated Universal Time. It may be a value from -12 hours to +13.75 hours. The value for Eastern Standard Time in North America is -5 hours.

Automatically Adjust for Daylight Time

This box selects the Daylight Time offset of your region from Coordinated Universal Time. It may be a value from -12 hours to +13.75 hours. The value for Eastern Daylight time in North America is -4 hours.

Sync every XX Hours

This value tells the TR-2100 how often to synchronize with the Time Server. The factory default setting is every 24 hours. The bar at the bottom displays when the next scheduled synchronization will take place.

FTP Upload Settings

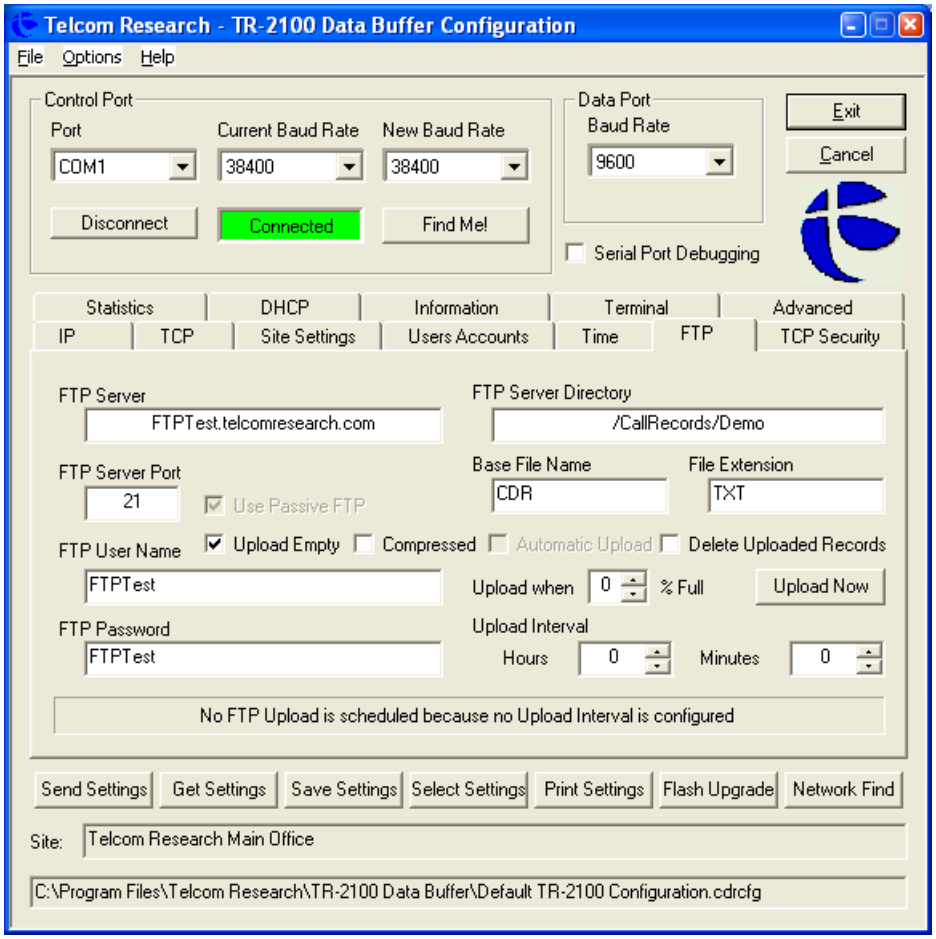


Figure 18 FTP Upload Settings

The TR-2100 can act as an FTP client and upload saved records to your FTP server at regular intervals or when a predetermined capacity has been reached.

FTP Server

This is the fully qualified domain name of the FTP server that will receive data records from the TR-2100. It must be 64 characters or less in length and must conform to the rules for ARPANET host names. They must start with a letter, end with a letter or digit, and have as interior characters only letters, digits, and hyphen. The Domain Name must contain the period character '.' to separate sub domains from each other and the root domain as in **ftp.telcomresearch.com**

FTP Server Directory

This is the name of the directory on the FTP server that the data records will be placed in. This directory must already exist. The TR-2100 will not automatically create it.

Base File Name

This is the first part of the file name to be used when storing records. The full file name is made from this base name, a hyphen, a unique 6-character sequence and the file

extension. Assuming a Base Name of DataRecord and an extension of .txt a typical file name would be similar to DataRecord-3NEVRD.txt. The unique 6-character sequence is generated from the time and date and therefore can be used to sort files chronologically.

File Extension

This is the extension of the file name to be used when storing records.

FTP Port

This is the TCP control port on the FTP server. This is normally port 21 but it may be changed

Upload Empty

This is useful for uploading a zero length file at the upload interval to confirm that the TR-2100 is alive and well.

Compressed

To double the speed of uploading you can upload in compressed format and uncompress the data records on the FTP server.

Automatic Upload

This box must be selected to enable upload at the time or interval set. If Upload Interval or a Percent Full is not set this control is automatically disabled.

Delete Uploaded Records

If automatic upload and either an upload time interval or a percentage is set this is automatically selected.

Upload When XX% Full

Set the percentage full point at which you want to upload records. Values below 50% are recommended but you can set it from 0% to 90%.

Upload Interval

You can set the time interval in Hours and Minutes between automatic uploads. For security reasons, the FTP server automatically assigns the Data Port.

FTP User Name

This is the User Name to send to the FTP server for authentication.

FTP Password

This is the Password to send to the FTP server for authentication.

Setting the TCP/IP Security Parameters

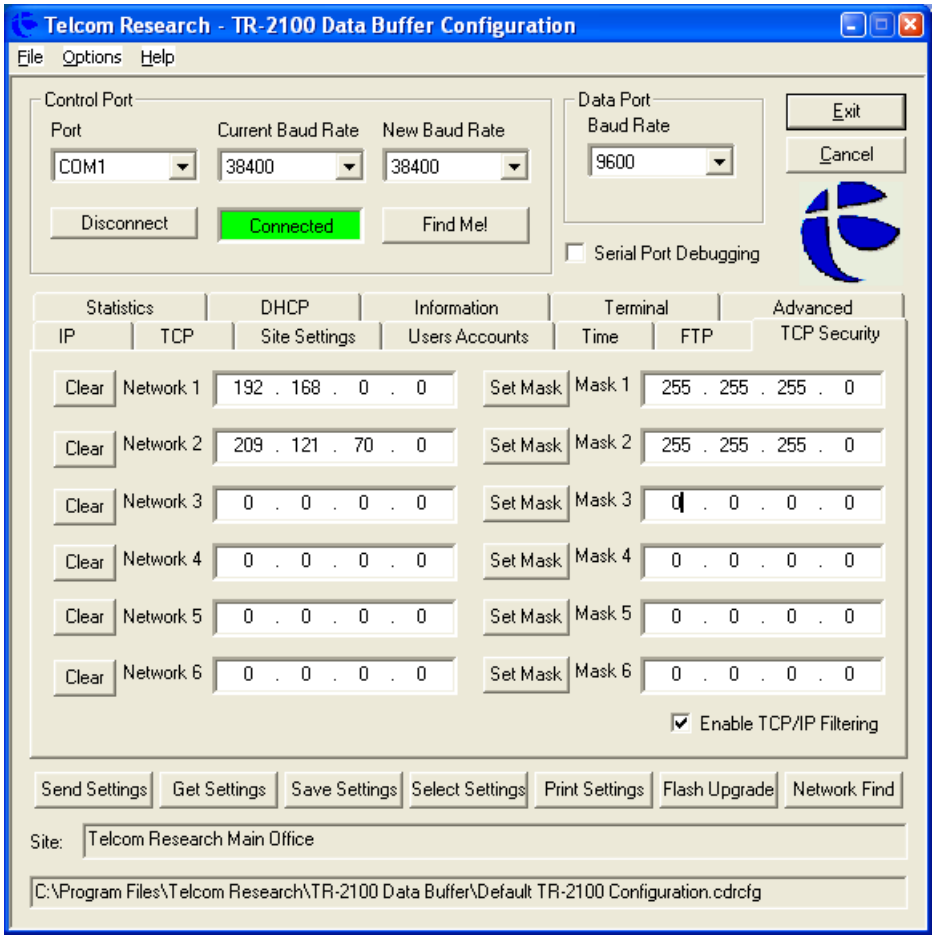


Figure 19 TCP/IP Security Parameters

One of the most simple and powerful methods of controlling inbound access is by using TCP/IP Filtering.

Internet access to the TR-2100 through TCP over IP can be restricted to certain external individual IP Addresses and/or ranges of IP Addresses. If the “Enable TCP/IP Filtering” box is checked then only TCP connections from the 6 Address and Mask fields will be accepted. IP with any protocol except TCP will still work from any address so DNS, NetBIOS Name Resolution, PING, ECHO and CAHRGEN protocols will succeed. TCP/IP Filtering can filter only inbound traffic. This feature does not affect outbound traffic or response ports that are created to accept responses from outbound requests.

If the “Enable TCP/IP Filtering” box is checked and no addresses are entered (the address value is 0.0.0.0), in the Address and Mask fields, then no TCP connections are possible.

To allow access from a single IP address set the Mask to 255.255.255.255.

Non-Contiguous Subnet Bits

Internet Standard 5 (RFC 950) actually specified that when splitting the bits in the host ID for subnet ID and host ID, it was possible and legal to split it in more than one place. This is referred to as “non-contiguous subnet bits” but the standard recommends against it. It states “However, we recommend that the subnet bits be contiguous and located as the most significant bits of the local address.” Today, now that classless addressing and CIDR are standard, it is simply illegal. Therefore the TR-2100 does not support “non-contiguous subnet bits”.

Statistics

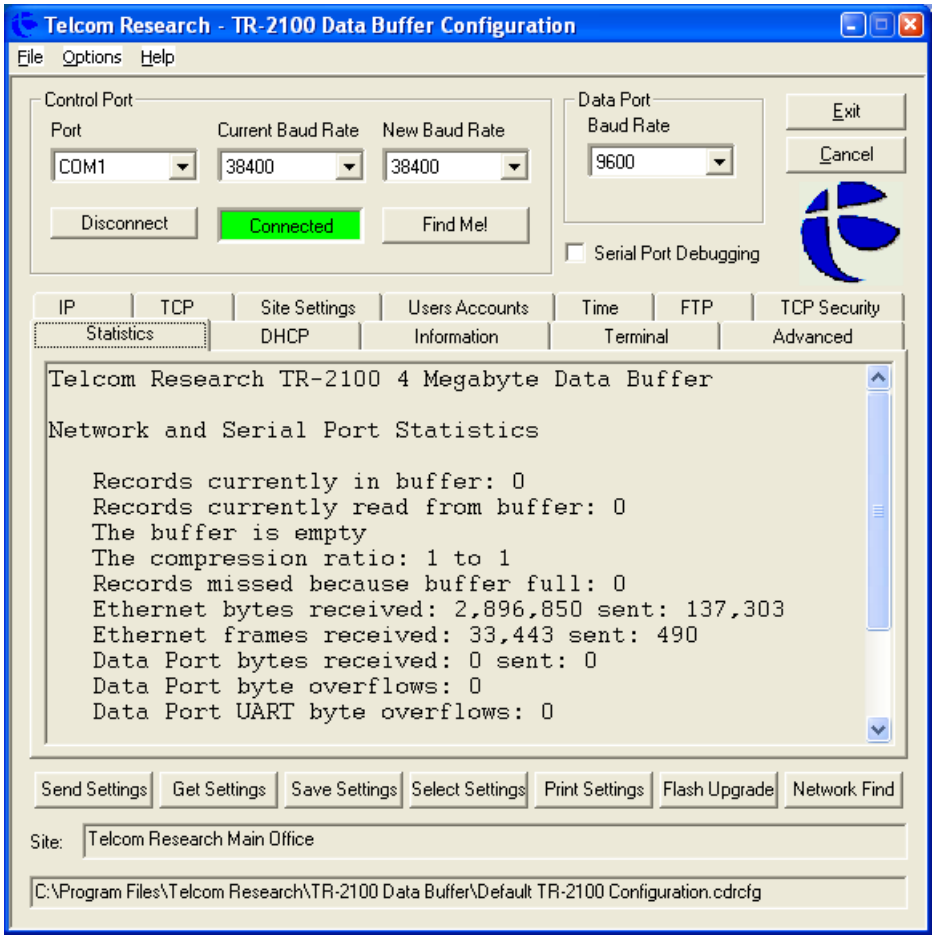


Figure 20 Statistics

This page presents various statistics and performance related to the state of the TR-2100. Information on this screen can be selected with the mouse and copied to the Windows clipboard.

The statistics include: Ethernet bytes received

- Ethernet bytes transmitted
- Ethernet frames received
- Ethernet frames transmitted

- Control Port bytes received
- Control Port bytes transmitted
- Control Port byte overflows
- Command Port UART byte overflows
- Data Retrieval Port bytes received
- Data Retrieval Port bytes transmitted
- Data Retrieval Port byte overflows
- Data Retrieval Port UART byte overflows
- Records currently in buffer
- Records currently read from buffer
- The buffer percent full
- The compression ratio
- Records missed because buffer full

DHCP Parameters

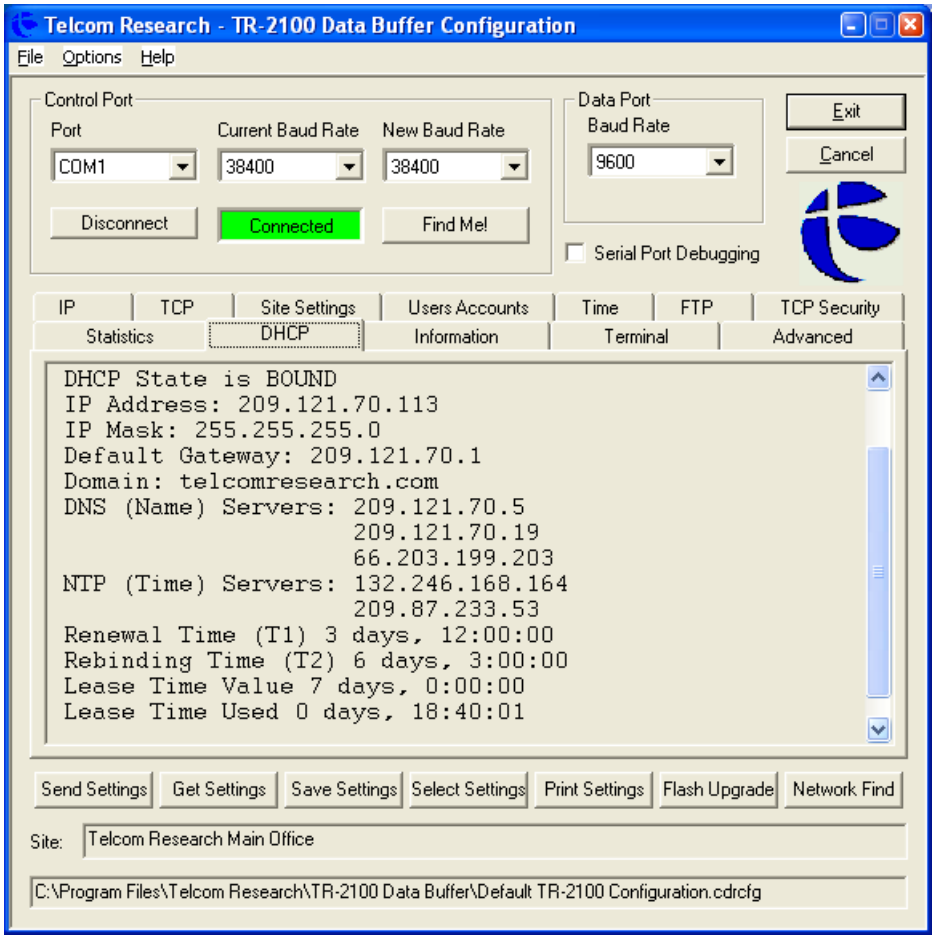


Figure 21 DHCP Lease Information

If DHCP configuration is enabled, this page shows the current DHCP state and the DHCP parameters assigned to the TR-2100 by the DHCP Server. Included in the information is the IP address of the DHCP server. Information on this screen can be selected with the mouse and copied to the Windows clipboard.

General Information

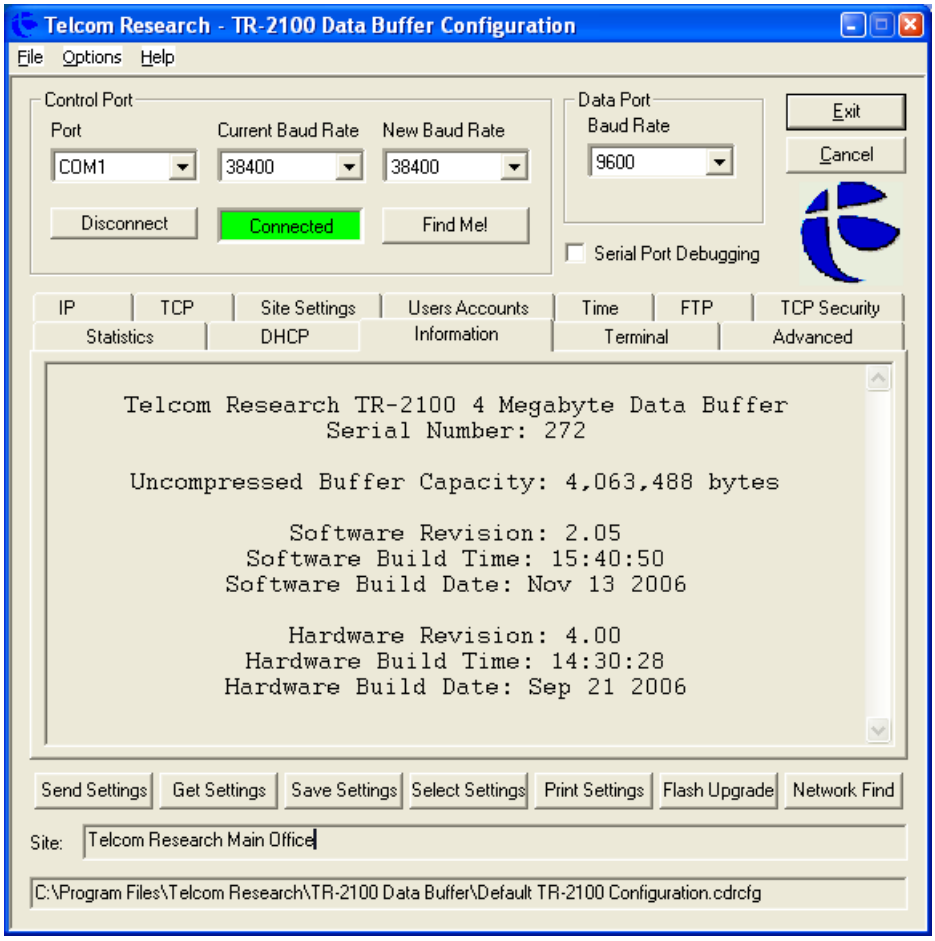


Figure 22 General Information

This page presents revision information, buffer capacity, serial number and time and dates of hardware and software subsystems. Information on this screen can be selected with the mouse and copied to the Windows clipboard.

Terminal

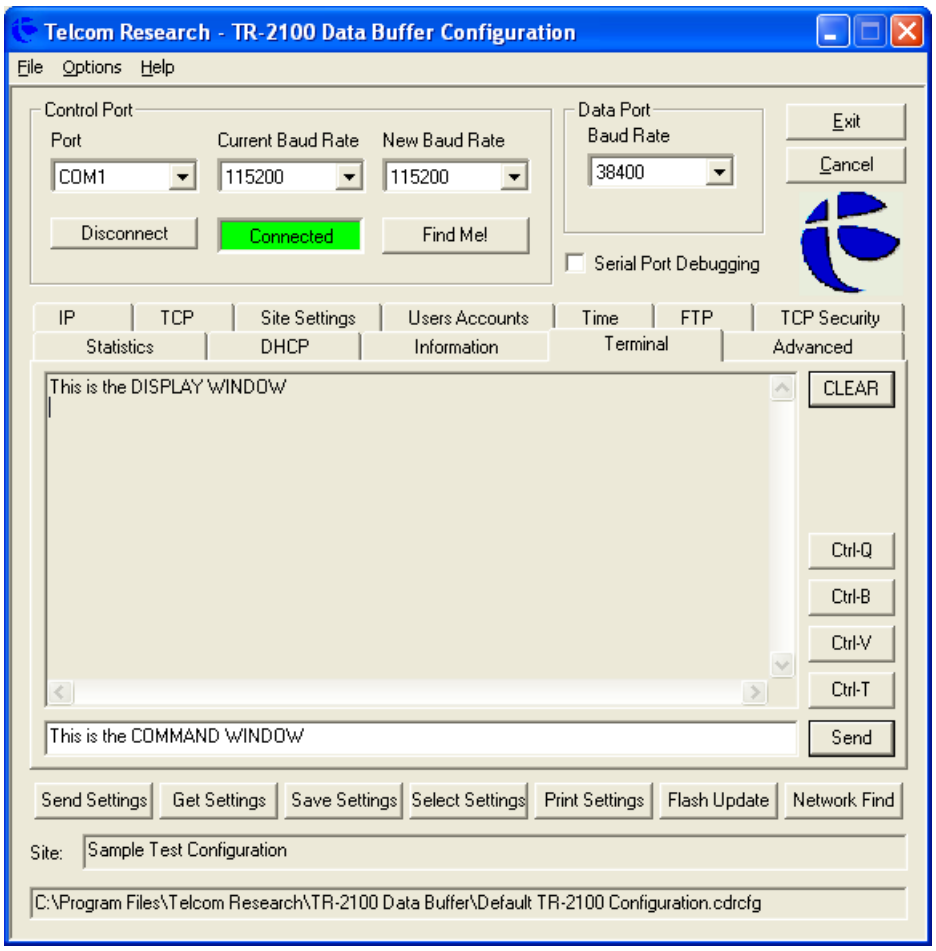


Figure 23 Terminal Screen

This is a terminal emulation window that lets you send arbitrary commands directly to the TR-2100 through the serial port. It displays the commands and responses from the TR-2100 in the large window. Any valid TR-2100 command can be sent with this tool. Please see the section Command Sets on page 91 for lists of valid commands. It contains the following elements.

Display Window

This is the large window in the center. It shows the commands that have been sent to the TR-2100 and the responses revived from the TR-2100. Information on this screen can be selected with the mouse and copied to the Windows clipboard.

When the window becomes full it will scroll upward. It can be scrolled back to view a full history of commands and responses.

Clear Button

This button clears the Display Window.

Ctrl-A, Ctrl-B, Ctrl-V and Ctrl-T

These buttons enter control character values used in TR-2100 commands that can't be typed on the keyboard in Windows.

Send

This button sends the command entered in the command window directly to its left. You can also press the 'Enter' key to do the same thing.

Command Window

This is the window to the left of the Send button. You can enter the common control characters by pressing the Ctrl-A, Ctrl-B, Ctrl-V and Ctrl-T buttons. Typing them including angle brackets exactly as shown in the following format enters other control characters:

<Ctl-X> where X is the printable version of the character to be entered as a control character.

Commands typed in here will be buffered and then sent to the TR-2100 when you press 'Enter' or the 'Send' button. This allows editing and correct typing mistakes before actually sending the command. This window also supports copy and paste.

The command is also copied to the 'Display Window' so that it is easy to follow a sequence of commands and responses.

Advanced

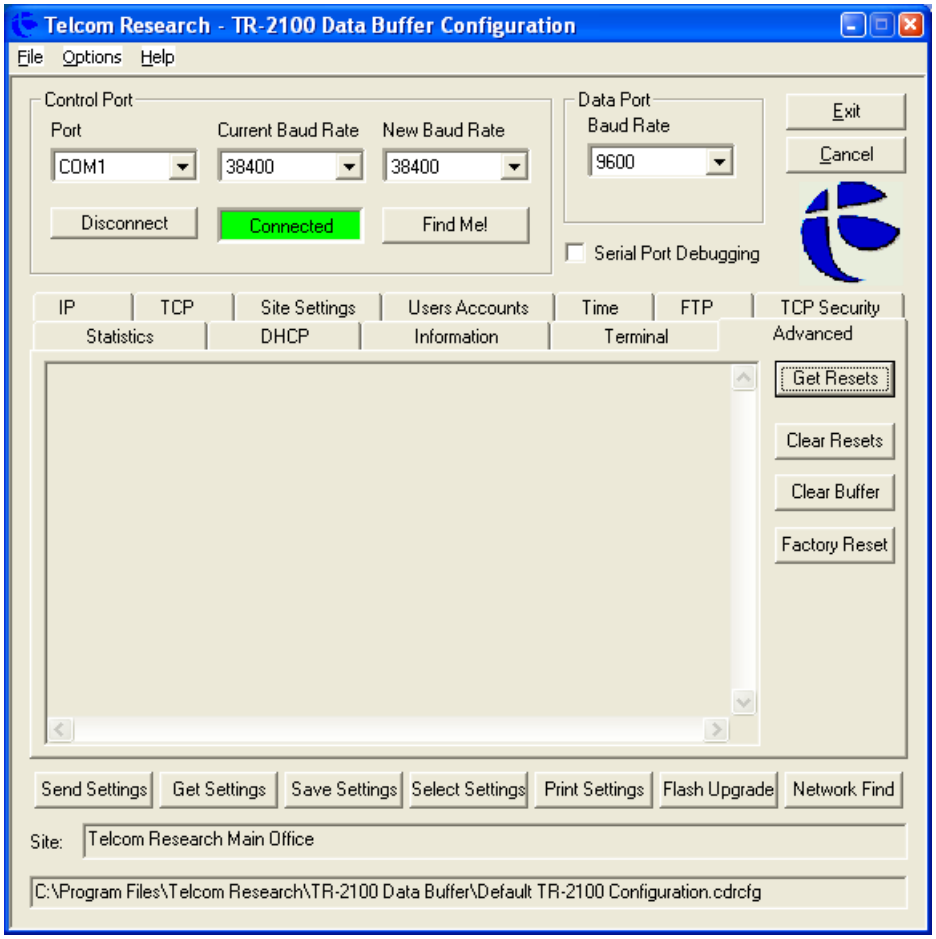


Figure 24 Advanced Diagnostic Screen

This screen is only available if the Advanced item on the Options Menu is checked.

Get Resets

This will list the time and date of the last 99 events that caused the TR-2100 to restart. Possible caused include Power-On Reset, Flash Update, RESTART Command, Watchdog Timer, Brown-out, External Reset and Jump to location 0 amongst others.

Clear Resets

This command empties the resets list.

Clear Statistics

This command clears the statistics that are displayed on the Statistics screen.

Clear Buffer

This clears all stored data in the buffer. The data is not recoverable.

Factory Reset

This command restores the TR-2100 to the condition it was when it left the factory. All user settings are reset to their factory defaults.

Chapter 6

Flash Program Memory Update

Download and run the latest setup program for the TR-2100 Windows Configuration Program from the Telcom Research Data Buffers WEB Site. The Setup Program (TR-2100_Setup.exe) installs the latest version of the TR-2100 Windows Configuration Program which contains a copy of the latest version of the TR-2100 firmware. It also installs the latest version of this manual in PDF format.

Automatic Flash Update

When you run the TR-2100 Windows Configuration Program and connect to your TR-2100, the program checks the current firmware version of the TR-2100 and if its version is newer, it will offer to update to the latest version and you will be presented with this window:

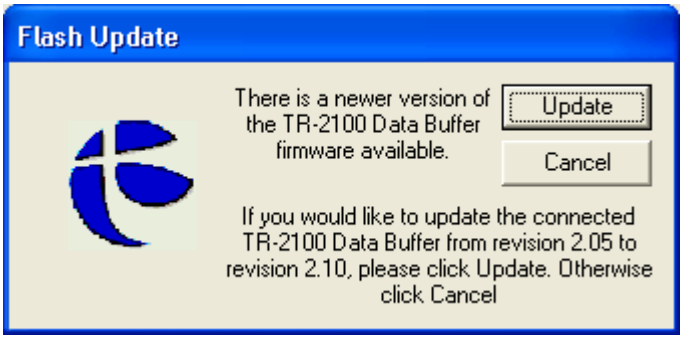


Figure 25 Automatic Offer to Flash Update

Because there may be new features in the TR-2100 that are required for the configuration program to run properly, you should select ‘Update’ to proceed. This will present the window shown in the following figure.

Note: If your TR-2100 is now programmed and you want to keep your current settings see the section Keeping Current Settings on page46.

Starting The Flash Update

Click the ‘Update Now’ button to proceed. The update should take about 30 seconds.

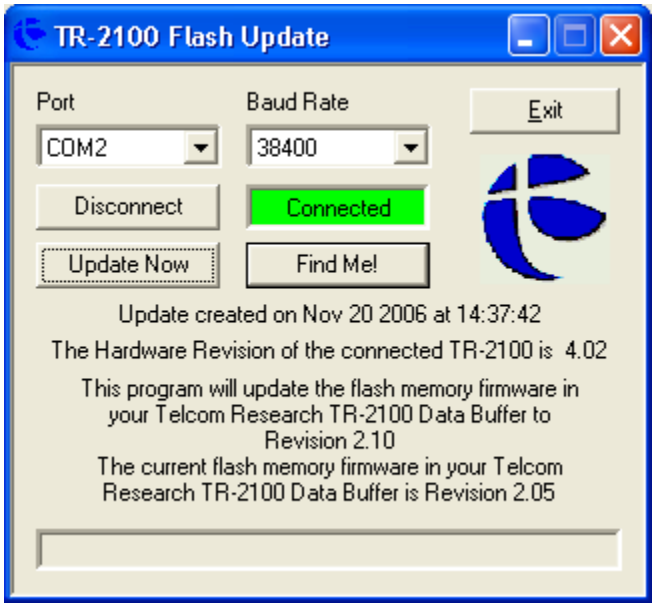


Figure 26 Initial Flash Update Screen

During the update all the buttons are disabled so that the update can't be interrupted. If for some reason (power failure, computer crash) the update fails, please refer to Flash Update Errors on page 45.

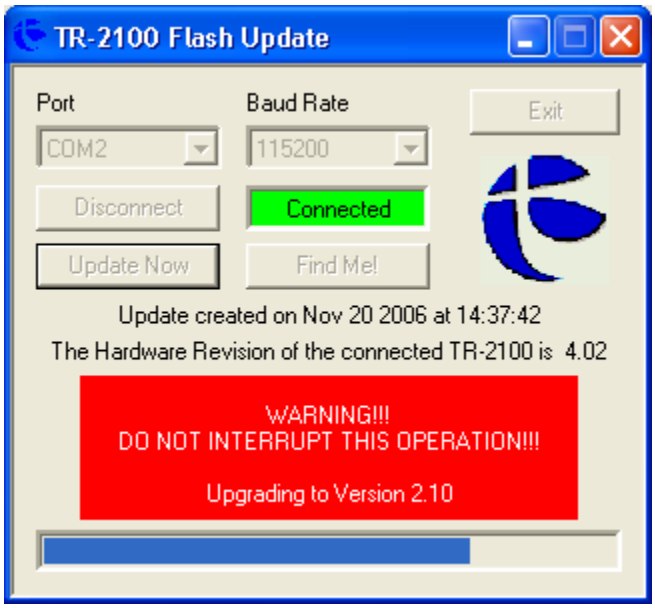


Figure 27 Flash Update in Progress

When the update is finished you will see the following notice. Depending on the The TR-2100 is now ready to configure or use.

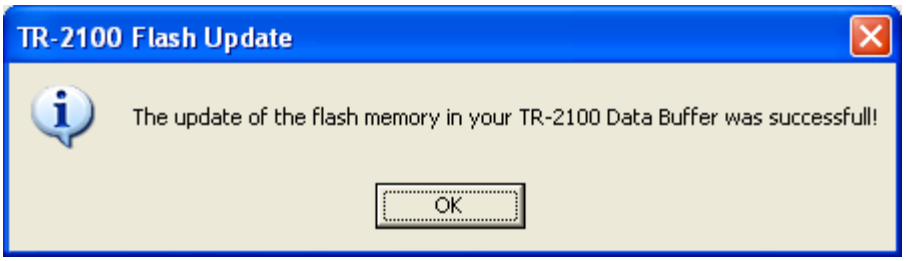


Figure 28 Flash Update Complete

Firmware updating is usually done either automatically by the TR-2100 Windows Configuration Program, if the TR-2100 Windows Configuration Program detects that the firmware distributed with the TR-2100 Windows Configuration Program is newer that the firmware present in the TR-2100, or by selecting 'Flash Update' in the TR-2100 Windows Configuration Program.

Flash Update Errors

If the communication between the TR-2100 and the PC is broken for any reason during firmware updating the TR-2100 will stop responding and will not work. All 8 LEDs on the front panel will continuously flash red. The TR-2100 is NOT broken. Simply select 'Flash Update' in the TR-2100 Windows Configuration Program. If you see the screen below with the red window saying 'Not Connected' just click 'Find Me!' to connect.

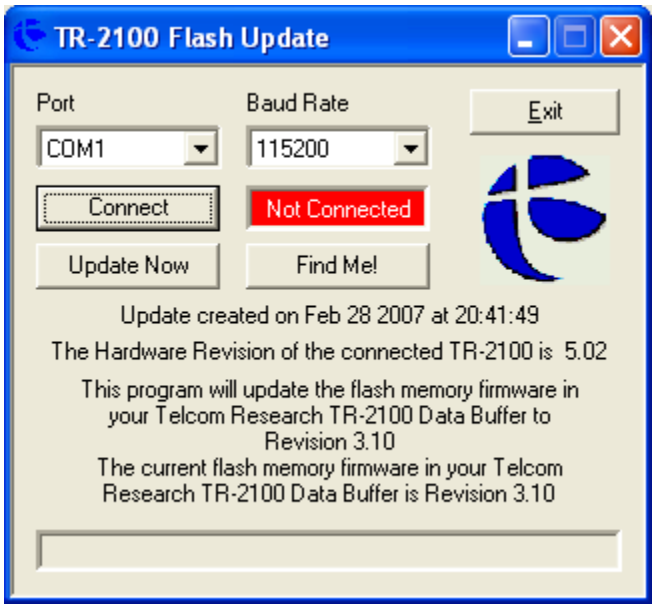


Figure 29 Flash Update Not Connected

Normally this window will be green and say 'Connected' and the above step is unnecessary. After connection click 'Update Now' and wait for the update to finish.

Once this is done the TR-2100 is up and running again

Keeping Current Settings

If your TR-2100 is now programmed and you want to keep your current settings do the following. Select 'Cancel' on the Automatic Offer to Flash Update dialog. Make sure you are still connected (connection window is green and says 'Connected'). If not, click 'Find Me!' to connect. Click 'Get Settings' to save the settings from your TR-2100.

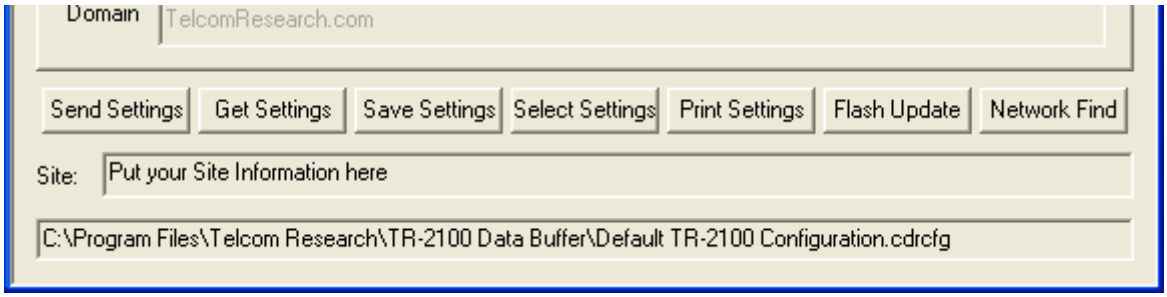


Figure 30 Send/Get Settings

During the 'Get Settings' step above you may see the following alert one or more times.

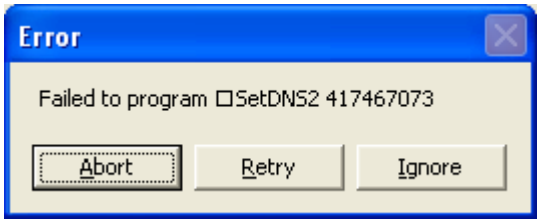


Figure 31 'Get Settings' Error Alert

This occurs if the newer version of the TR-2100 contains settings that are not present in the older version. If you see this error alert click 'Ignore'.

Return to Starting The Flash Update to finish. After the update the TR-2100 may take up to 20 seconds to restart. After the 'Run' light turns solid green click on 'Send Settings' to restore your configuration information.

Chapter 7

Network Finder

This window will locate all TR-2100s on your Ethernet network. It will find them even if their IP addresses are not part of your computer's IP subnet, they just have to be connected to your local Ethernet.

For each TR-2100 found, a page is added to the window. The page contains extensive information about the TR-2100 including the settings of all programmable features. It also displays the current DHCP assigned values if DHCP has been enabled and a valid IP address has been acquired from a DHCP server.

The Network Finder includes the following controls:

Exit

This will close the Network Finder window.

Find Us!

This starts the LOCATE process. As each TR-2100 is found a page of detailed information is added to the Network Finder window. Click the tabs along the top of the window to see each page. The tabs contain the Host Name of each TR-2100.

By Name

Tells the Connect button below to use the name of the currently displayed TR-2100 when connecting. The name is first resolved by a DNS lookup and if that fails a NetBIOS broadcast is used to resolve the name.

By IP

Tells the Connect button below to use the IP address of the of the currently displayed TR-2100 when connecting.

Connect

This button is enabled if the currently displayed TR-2100 is on the same IP subnet as your computer. It is disabled otherwise.

The Button opens your default WEB browser and connects to the TR-2100. You can choose between connecting by the name on the tab or the IP address. You can now configure the TR-2100 to your requirements with your WEB browser.

Copy All

This will copy all of the information on the current page to the Windows Clipboard. It includes information that is off the top or bottom of the page. You can then paste it into any Windows program.

With your mouse you can also select a portion of the displayed page and copy it to the clipboard with Control 'C', Control 'Insert' or right clicking and selecting 'Copy' from the context menu.

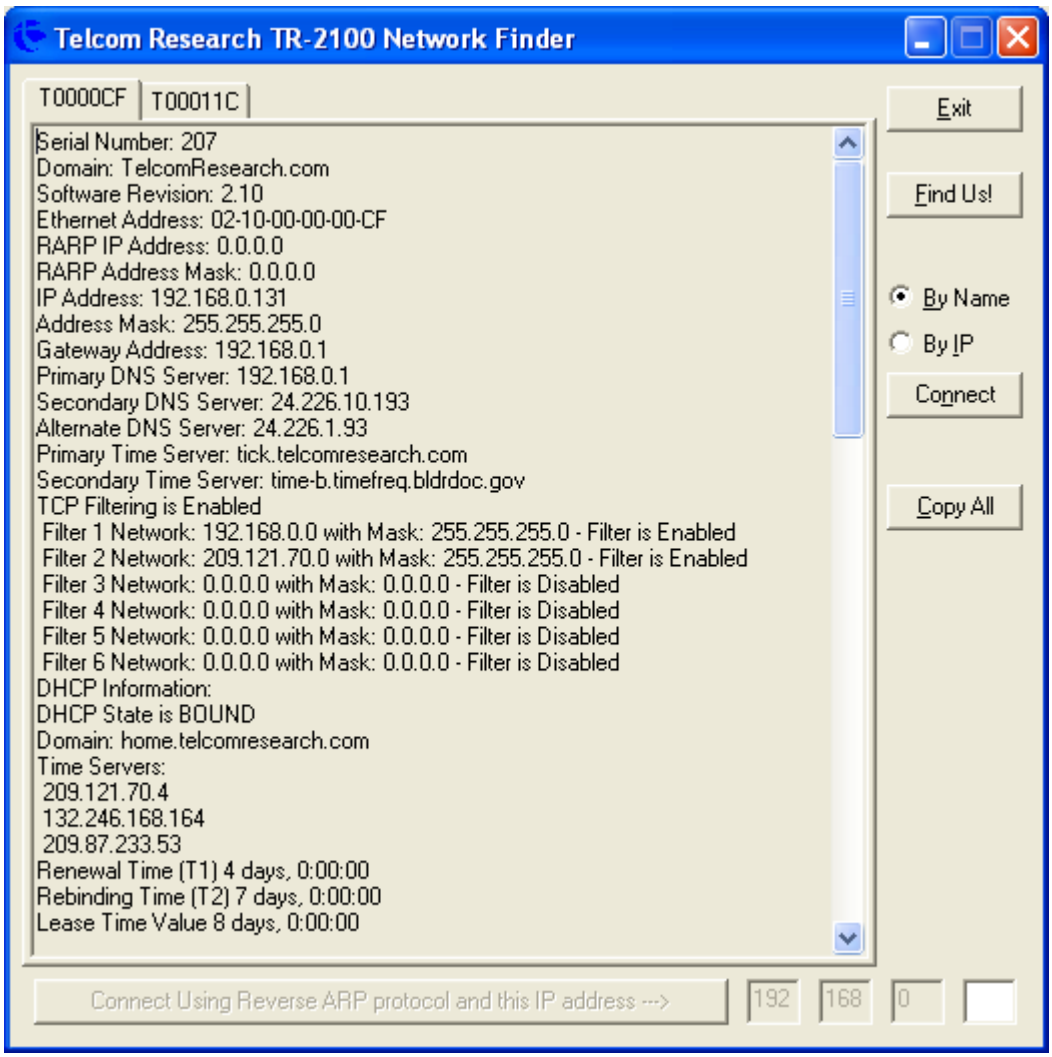


Figure 32 Network Finder

Connect Using…

This is the wide button along the bottom edge of the window. It will be enabled only if the TR-2100 is not on your local IP subnet. To use it, complete the IP address to the right of the button. This is a temporary address that will be used to connect your WEB browser to the TR-2100. The parts of the IP address that identify your IP subnet are already filled in and you can't change them. After completing the address pressing the 'Connect Using …' button will first determine if the IP address is

currently in use or is reserved for another device on your network. This process can sometimes take up to 10 seconds to perform the tests necessary to verify that the address is available. If it is not available you will be informed and asked to choose another address. If it is available the address will be assigned to the TR-2100 using reverse ARP, then your browser will be opened and connected to the TR-2100. You may now change any of the settings on the TR-2100.

This technique will allow you to assign a foreign IP address before installation at a remote site because the RARP address allows you to stay connected even after changing the assigned IP address or enabling DHCP. The RARP address remains active until power is removed or it is specifically removed by the ‘Clear Reverse ARP Address’ check box on the WEB browser IP page.

Chapter 8

TR-2100 Web Configuration

The TR-2100 can be configured through its built-in WEB Server. Configuration can be done across the room or across the world via the Internet. Embedded in this feature is integrated online help.

How to Connect

To connect to a TR-2100 you must know either the name or the IP address of the unit your attempting to connect to. If the address is in one of the groups in the table of Reserved IP Addresses For Private Networks on page 24 then it is not accessible outside your local network. If it is not in this group you should be able to connect to it from anywhere in the world.

NetBIOS Name Resolution

If you are on a Windows Network or a Linux Network that supports Samba you can use NetBIOS name resolution to connect to the TR-2100 by name and not IP address. To use this method you must specify the name of the TR-2100 as **http://t0111** without a domain name (Not **http://t0111.home.telcomresearch.com)**. The reason for not including the domain name is NetBIOS name resolution uses an IP broadcast protocol that is not routable. Therefore this will not work through routers or over the Internet.

DNS Name Resolution

If you are not on a Windows Network and you want to connect by name, there must be a DNS entry for the TR-2100. If you connect from outside your local network you must use the fully qualified domain name. In our example this would be **http://t0111.home.telcomresearch.com**. If you are connecting locally you usually only need the host portion of the name as in **http://t0111**. If the default WEB configuration port is not 80 then you must add **:XXXX** to the address, where XXXX is the WEB configuration TCP port you have selected. The default port used for connection is 80. Substitute the HTTP Configuration Port set previously in the TCP Settings of the TR-2100. Port 80 is the default HTTP port on the Internet. We recommend that you change it as a security measure.

No Name Resolution

If you want to connect by IP address you don't need to know the host name or the domain name. You only need to know the IP Address and the port number. In our example the address you would use in your browser is **http://192.168.0.129**. Notice that

this address is not routable according to the table of Reserved IP Addresses For Private Networks on page 24 and therefore is only accessible from the local network.

Behind A Firewall

If the TR2100 is behind a firewall you must use the firewall's IP address and configure the firewall to forward port 80 to the TR-2100.

Login Screen

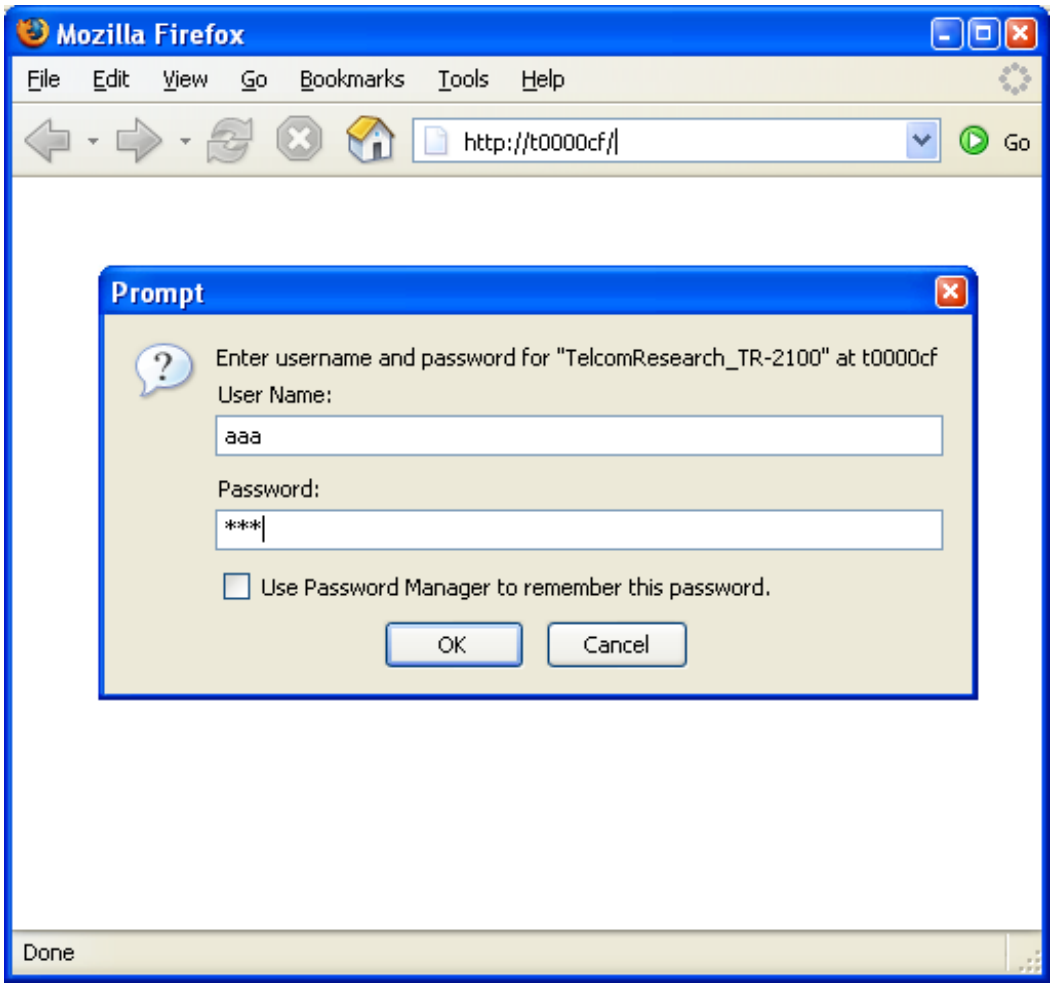


Figure 33 WEB Configuration Login

When you try to connect the first thing you should see is shown above. Enter your user name and password to gain access to the TR-2100. If the TR-2100 is new or has had a Factory Reset done the User Name is **AAA** (case insensitive) and the Password is **aaa** (case sensitive).

WEB Configuration Home Page

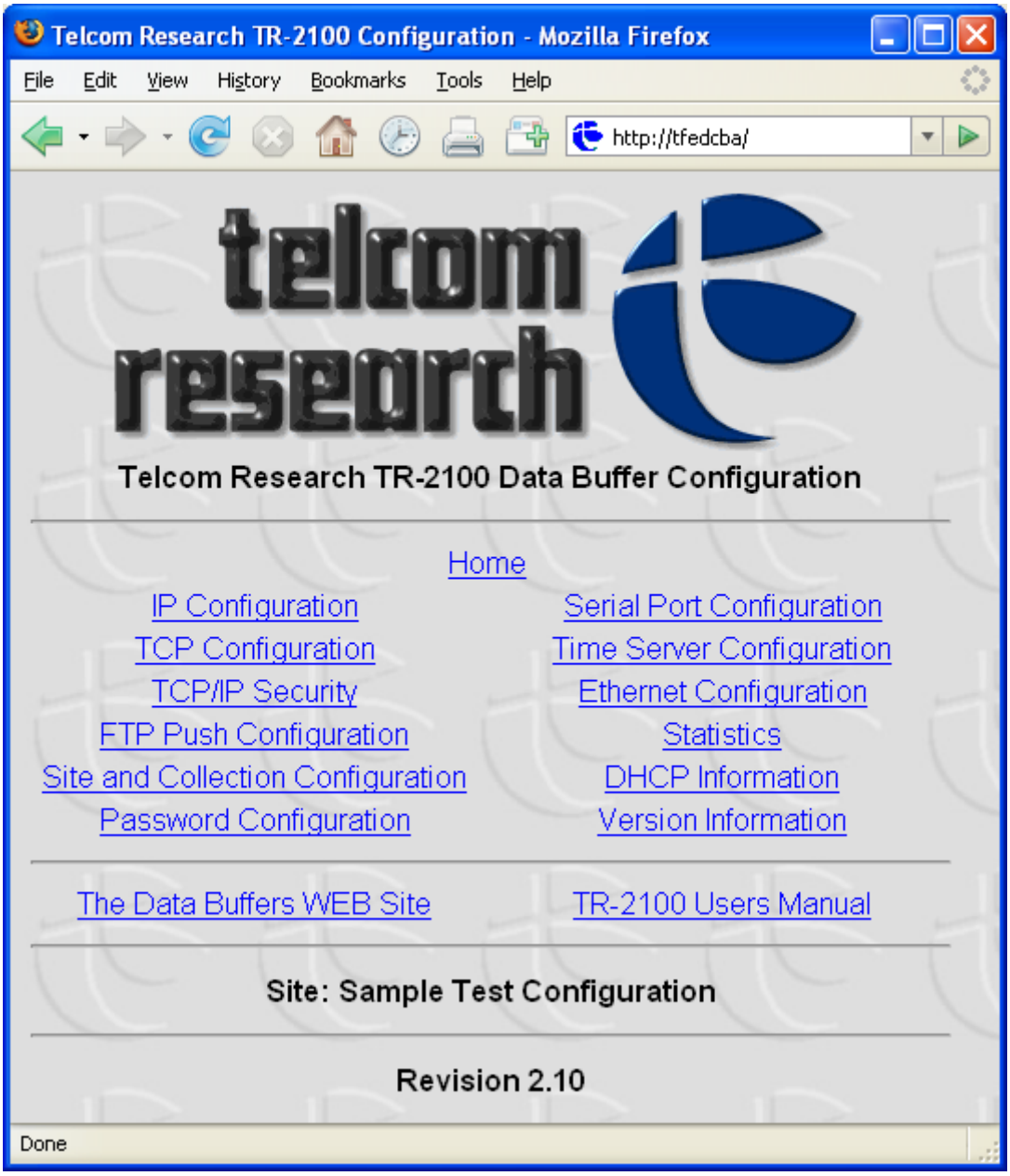


Figure 34 WEB Configuration Home Page

After successfully connecting you should see the figure above, the TR-2100 home page. This page has hyperlinks to all the other pages. This WEB Site is only 2 levels deep.

Ethernet Configuration WEB Page

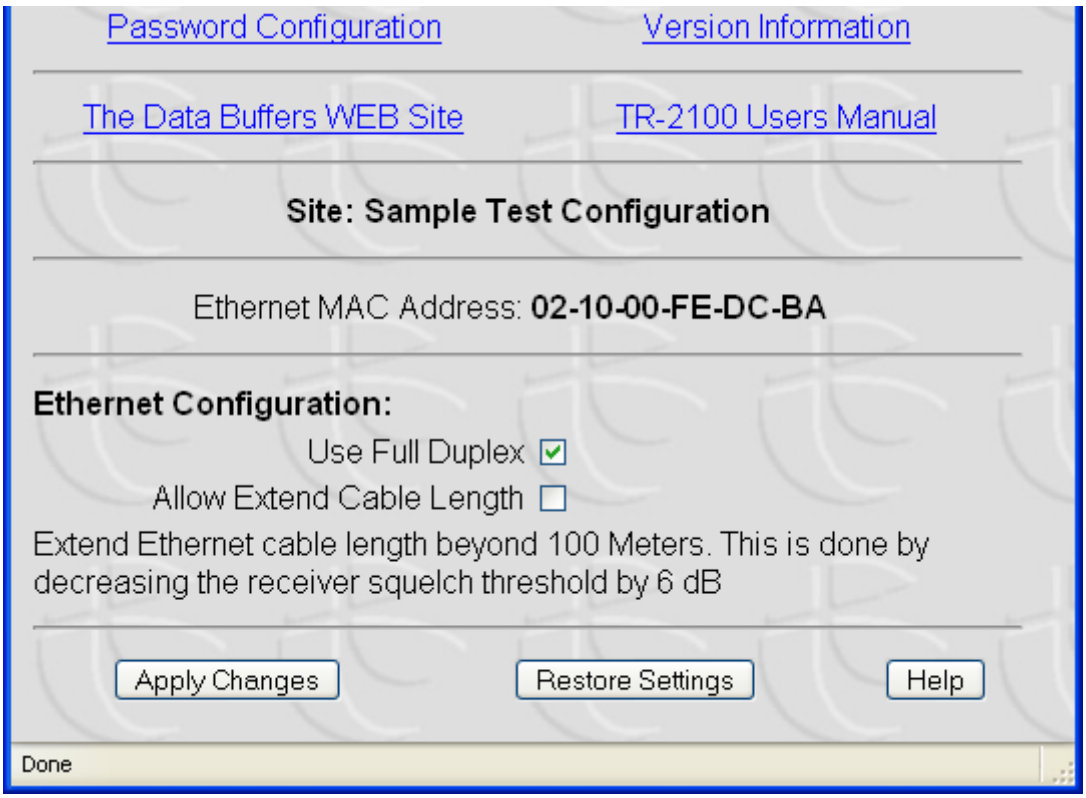


Figure 35 WEB Configuration Ethernet Page

Use Full Duplex

This effectively doubles the network throughput by allowing simultaneous transmission and reception. All modern network hubs support this.

Allow Extended Cable Length

This allows the TR-2100 to operate with cables that are longer than 100 meters (100 meters is the maximum length specified by the Ethernet standard). The exact additional distance depends on the quality of the cable and the amount of electromagnetic noise in the surrounding environment.

DHCP (IP) Configuration WEB Page

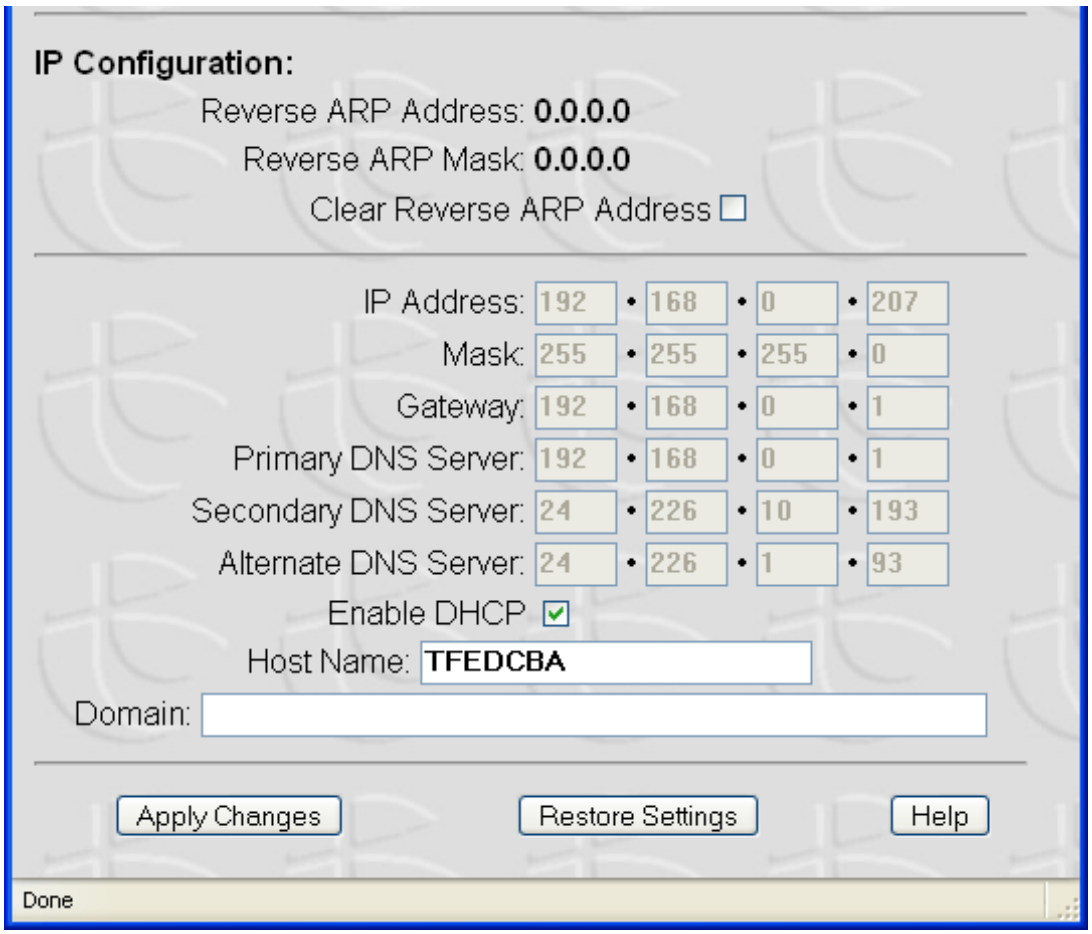


Figure 36 WEB Configuration DHCP Page

For detailed information on using DHCP, please refer to the section Automatically Setting the IP Parameters using DHCP on page 22.

To enable DHCP configuration, confirm that **Enable DHCP** is checked then click **Apply Changes**.

IP Configuration WEB Page

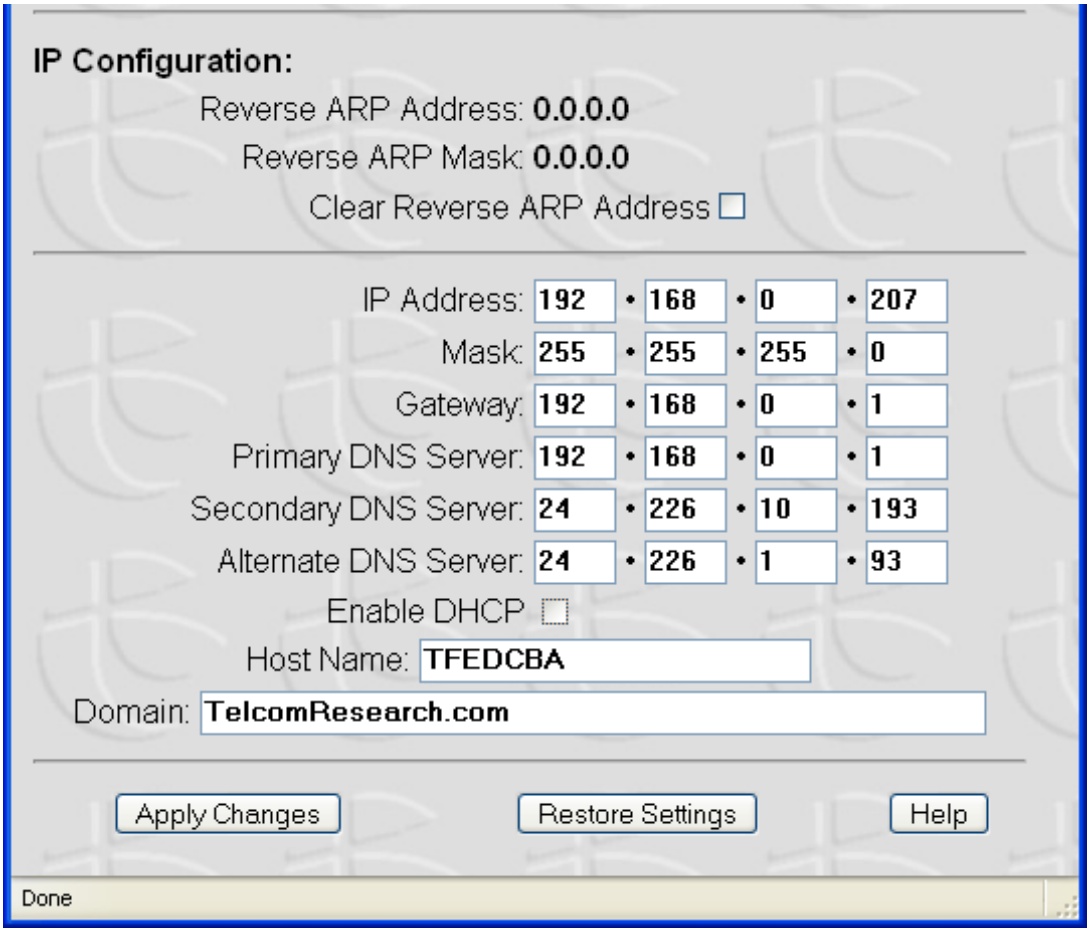


Figure 37 WEB Configuration IP Page

To set the IP parameters manually follow the same instructions for determining and entering the values as described in the section Setting the IP Parameters Manually on page 23. If you initially configured with Reverse ARP, check 'Clear Reverse ARP'. After completing these steps click on **Apply Changes.**

*CAUTION! If you change IP address you may be disconnected after clicking on **Apply Changes**. If you are connected to the same subnet as the TR-2100 you should be reconnected after a few seconds because reverse ARP (see description of Reverse ARP Configuration on page 83) will acquire the TR-2100's old address. If you are disconnected it will be necessary to redirect your WEB browser to the new address.*

TCP Configuration WEB Page

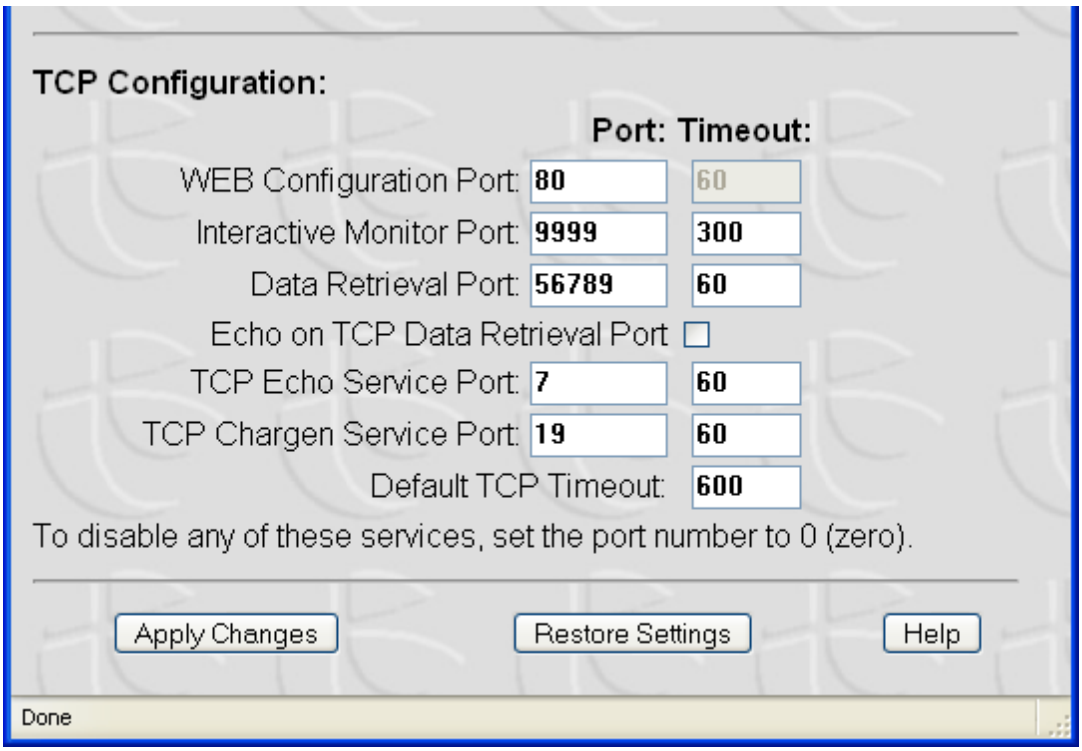


Figure 38 WEB Configuration TCP Page

To set the TCP parameters follow the same instructions for determining and entering the values as described in the section Setting the TCP Parameters on page 25.

After completing these steps click on **Apply Changes.**

*CAUTION! If you change the WEB Configuration Port you will be disconnected after clicking on **Apply Changes**. It will be necessary to redirect your WEB Browser using the new port.*

Serial Port Configuration WEB Page

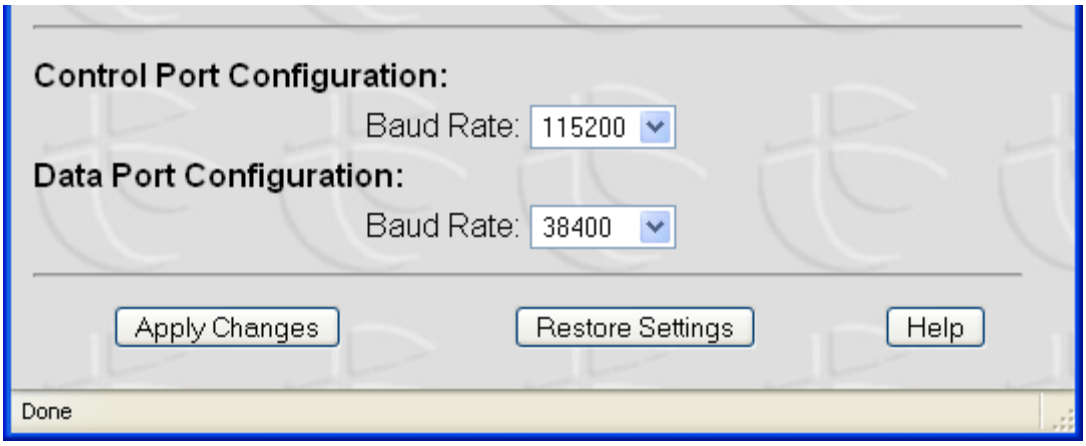


Figure 39 WEB Configuration Serial Port Page

This page sets up the serial ports in the TR-2100. Select baud rates appropriate for the Data Source you are connecting to and the modem or computer that is connected to the CONTROL PORT. Then click **Apply Changes**.

Password Configuration WEB Page (Security and Accounts)

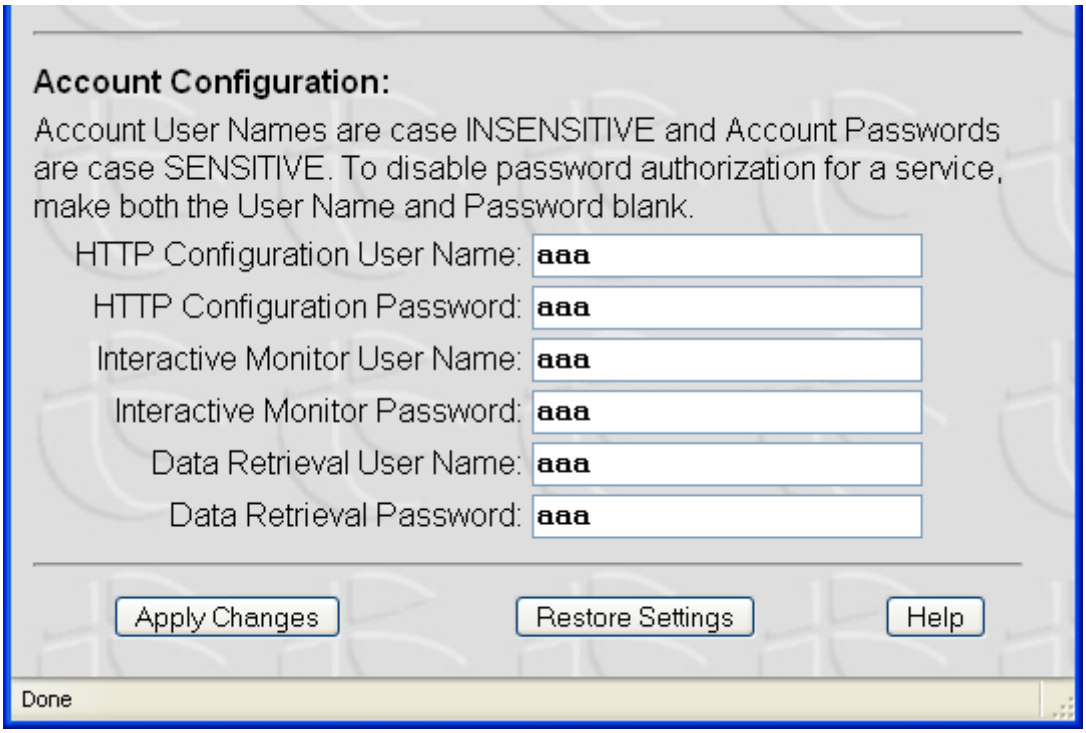


Figure 40 WEB Configuration Security Page

All Internet connections to the TR-2100 can require password authentication. We strongly advise using passwords to restrict access to the TR-2100. User names and

passwords may be 1 to 16 characters long. If the user name or password field is blank then no authentication is performed and the user will not be presented with a logon request. The User Name field is not case sensitive but the Password field is case sensitive.

DHCP Information WEB Page

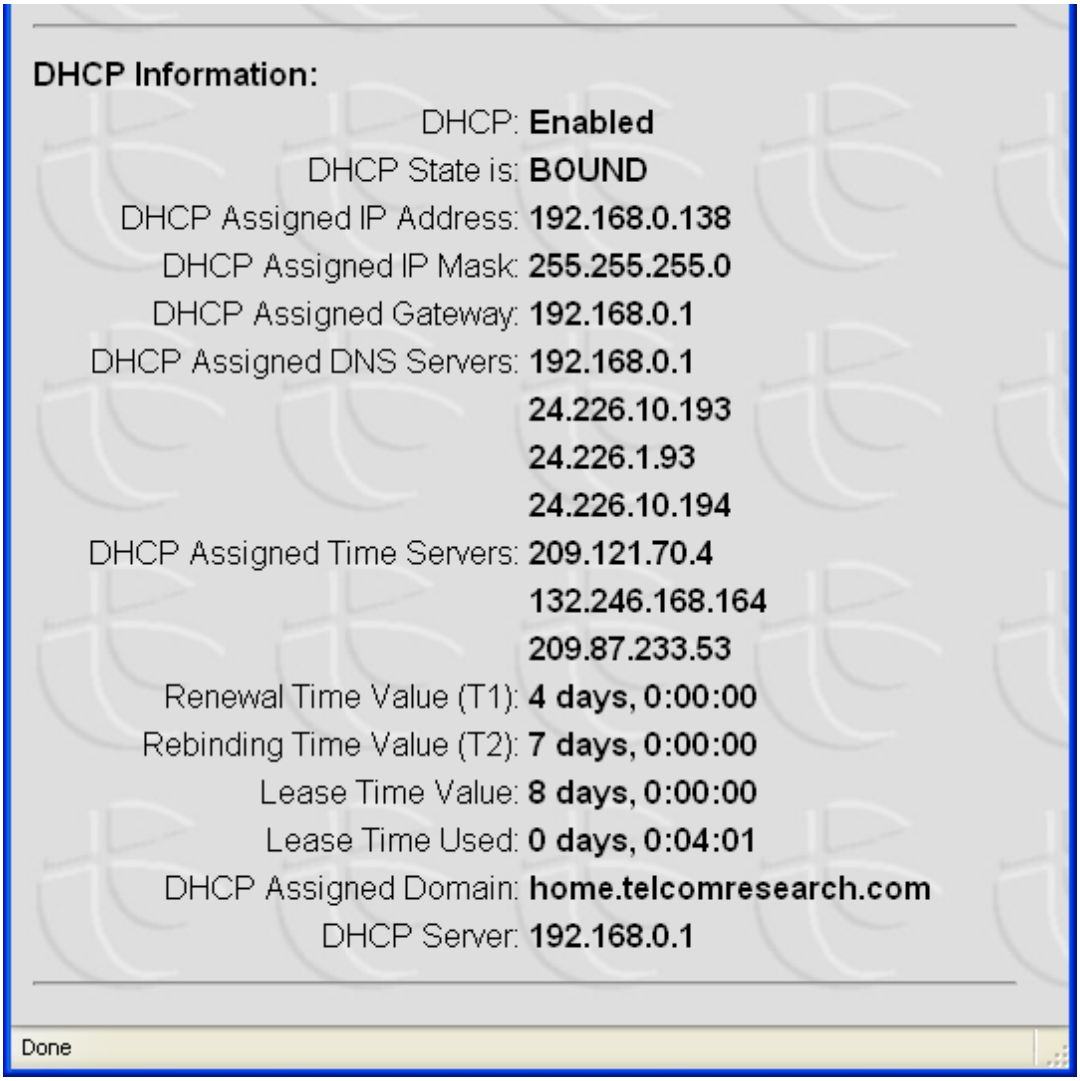


Figure 41 WEB Configuration DHCP Lease Information Page

If DHCP configuration is enabled, this page shows the current DHCP state and the DHCP parameters assigned to the TR-2100 by the DHCP Server. The IP address of the DHCP server is displayed in the information.

Most DHCP servers in use today will automatically create DNS foreword (A records) and reverse (PTR records) entries in a domain's DNS Server.

Statistics WEB Page

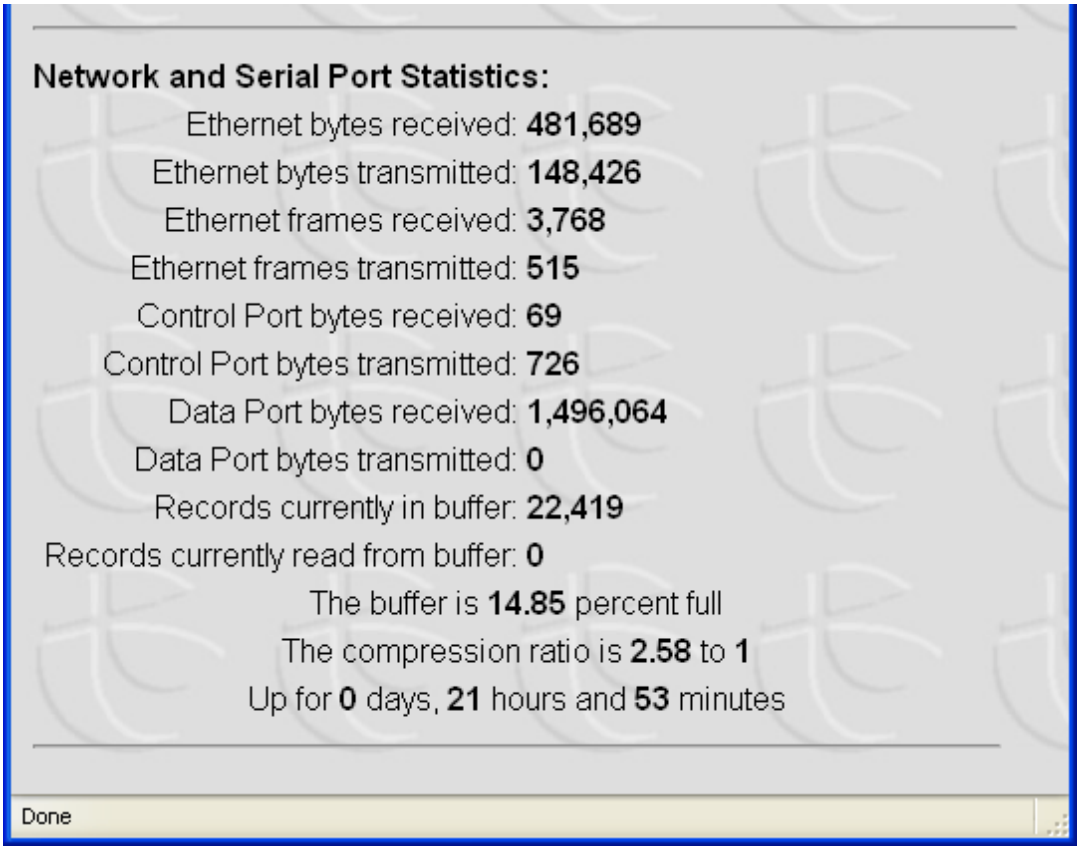


Figure 42 WEB Configuration General Statistics Page

This page shows various statistics from the TR-2100. The illustration above shows the information available.

FTP Push Configuration WEB Page

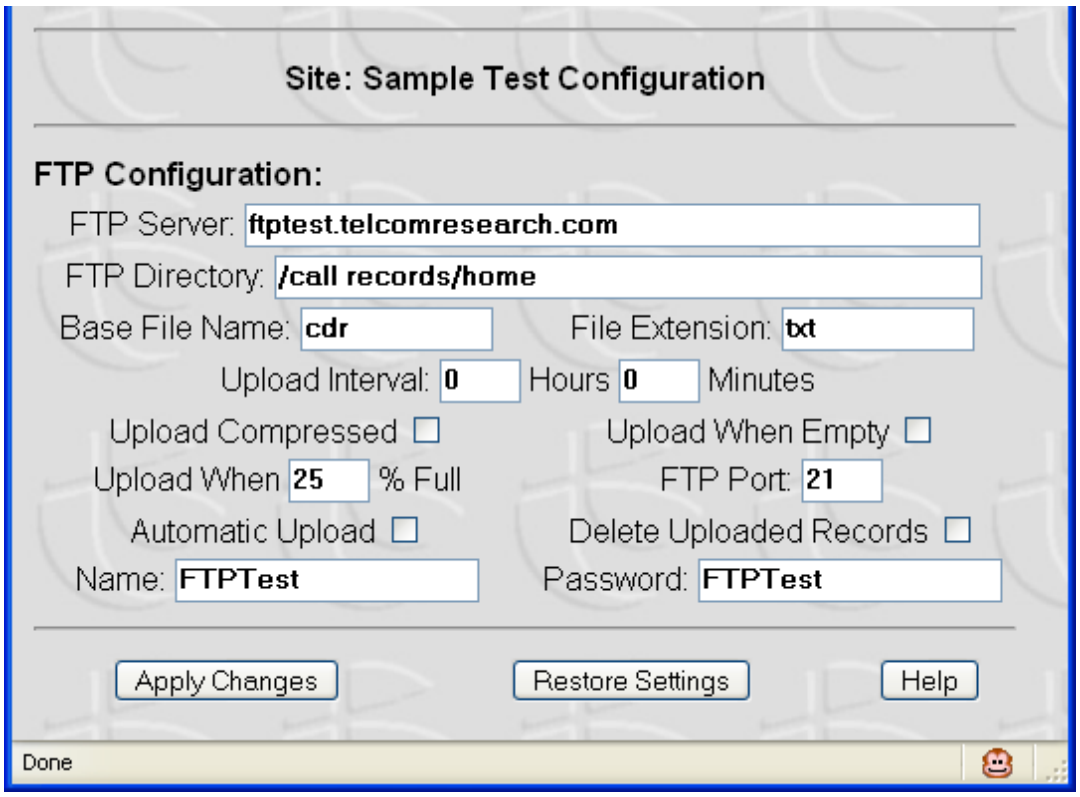


Figure 43 WEB Configuration FTP Client Page

This page is used to configure the FTP upload settings. These settings are fully described in the section FTP Upload Settings on page 33 and in the online WEB help (click the Help button).

Time Server Configuration WEB Page

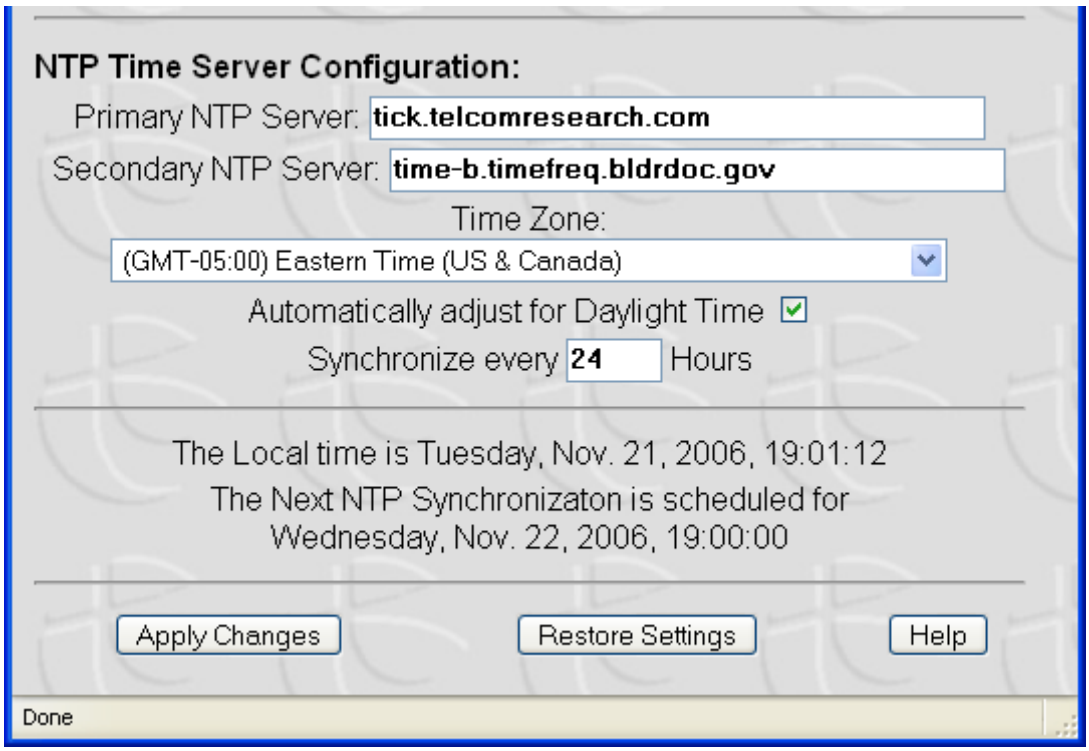


Figure 44 NTP Time Server Configuration WEB Page

This page is used to configure the Network Time Server settings. These settings are fully described is section SNTP (Time Server) Settings on page 31 and in the online WEB help (click the Help button).

Version Information WEB Page

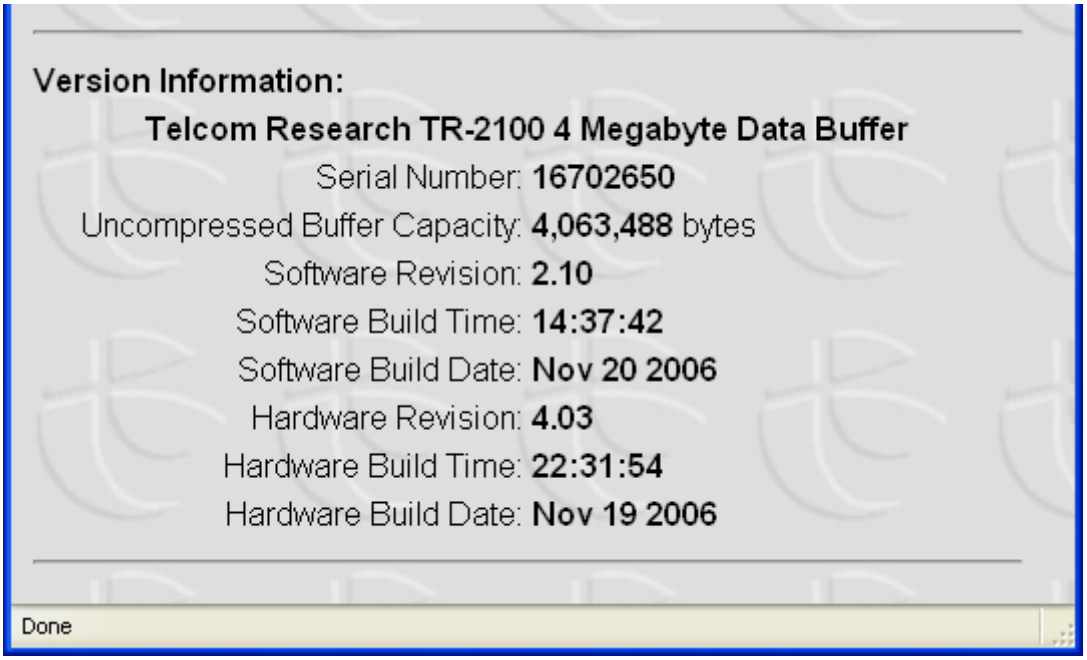


Figure 45 Version Information WEB Page

This page displays general information about the TR-2100. This is fully described in the section General Information on page 38.

TCP/IP Security WEB Page

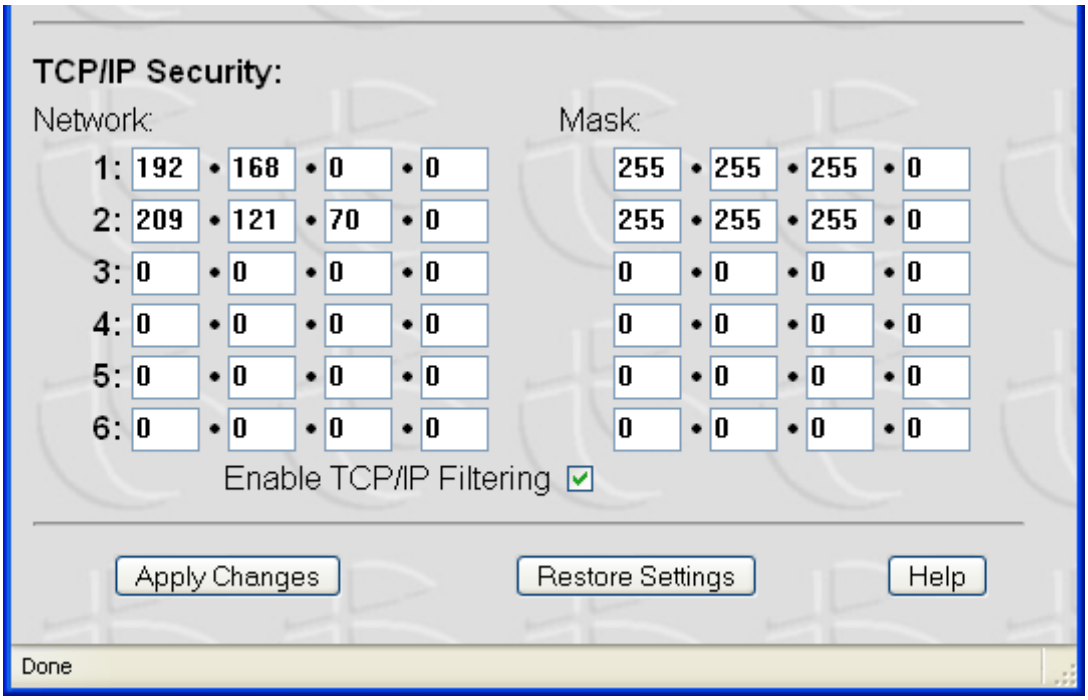


Figure 46 IP Security WEB Page

This page is used to configure the TCP/IP Security settings. These settings are fully described in the section Setting the TCP/IP Security Parameters on page 35 and in the online WEB help (click the Help button).

Site and Collection Configuration

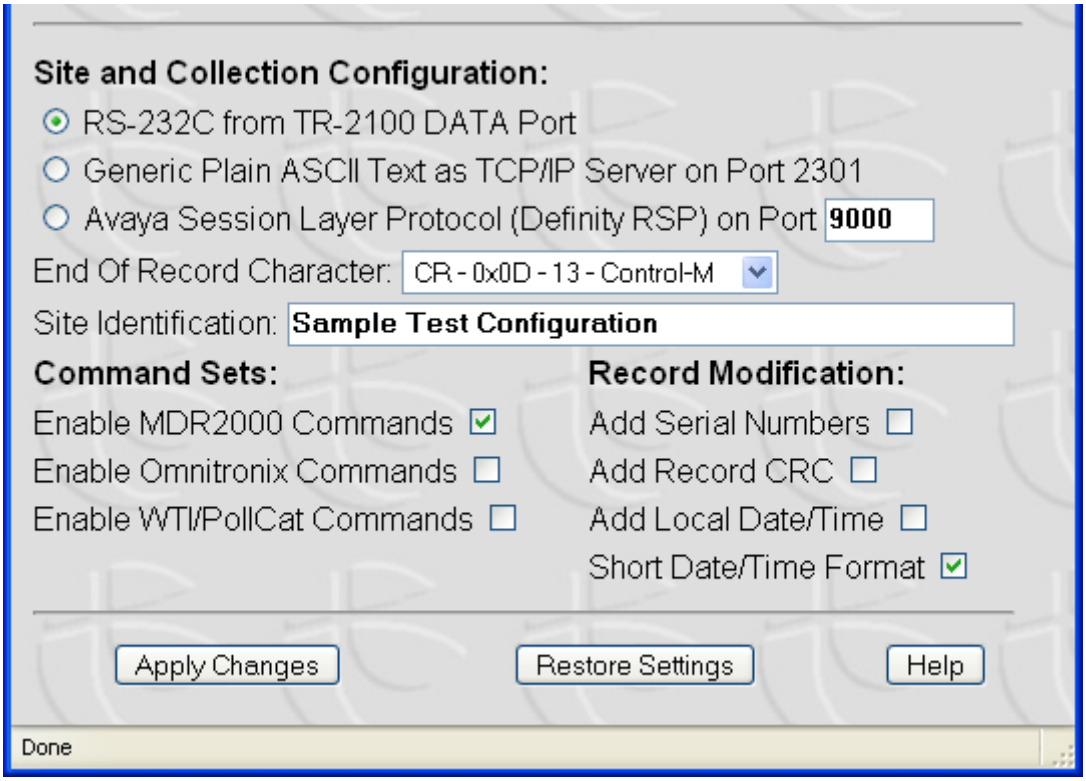


Figure 47 Site and Collection WEB Page

Online Help

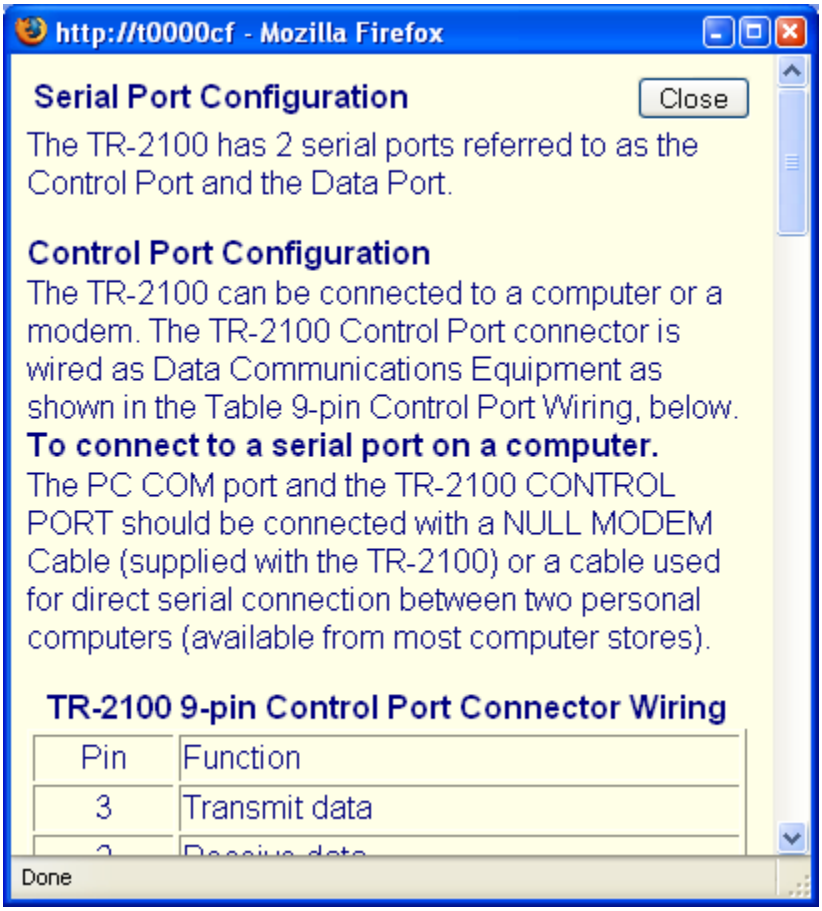


Figure 48 Online Help

Each page that has settings that can be changed has an integrated online help facility. Clicking on the Help button at the bottom of the page opens a small Help Window with detailed information about all the settings on that page.

Chapter 9

TR-2100 Interactive Monitor

The TR-2100 Interactive Monitor can be used to configure and control the TR-2100. It can be used from the Control Serial Port or over the Internet/intranet through a Telnet Protocol connection. Both methods are described in detail below. Although this method of configuration works well, the WEB interface (for remote use) or the TR-2100 Windows Configuration Program described on page 15 (for local use) are the preferred methods.

Connecting with Telnet

Start a Command Shell from your operating system so that you can enter the following commands directly. The symbol "↵" denotes the Enter Key.

Note: To open a command prompt in Windows, click Start, point to Programs, point to Accessories, and then click Command Prompt

Alternatively you can use a Telnet client program such as HyperACCESS or HyperTerminal. In the following pages we have used the Telnet client included with Windows 2000/XP.

The name or the IP address of the TR-2100 is required to connect to it. If the IP Address is in one of the groups of Reserved IP Addresses For Private Networks, (page 24), it is not accessible outside your local network. However, if it is not in one of these groups you should be able to connect to it from anywhere in the world.

Name Resolution

The factory assigned name of the TR-2100 is printed on the label on the bottom of the case. A Factory Reset will always restore this name. The name may be changed to whatever you desire or whatever your system requirements dictate. The only restrictions for changing the name are that it be up to a maximum of 16 characters and follow the rules for ARPANET host names. The name must start with a letter, end with a letter or digit and contain only letters, digits or hyphens in the middle.

Figure 49 TR-2100 Label Showing Name, Ethernet Address and Serial Number

NetBIOS Name Resolution

If you are on a Windows Network or a Linux Network that supports Samba you can use NetBIOS name resolution to connect to the TR-2100 by name. To use this method you must specify the name of the TR-2100 without a domain name as in:

```
C:\>telnet T3135B1 9999
```

The reason for not using a domain name is that NetBIOS name resolution uses an IP broadcast protocol that will not work through routers or over the Internet.

DNS Name Resolution

If you are not on a Windows Network and want to connect by name there must be a DNS entry for the TR-2100. If you connect to the TR2100 from outside your local network you must use the fully qualified domain name. In our example this would be

```
C:\>telnet T3135B1.telcomresearch.com 9999
```

If you are connecting locally you usually only need the host portion of the name as in

```
C:\>telnet T3135B1 9999
```

Notice the **9999** appended to the address. This is the default port used for connection. Substitute the Interactive Monitor Port that was previously set in the TCP settings of the TR-2100

No Name Resolution

If you want to connect by IP address you don't need to know the host name or the domain name. You only need to know the IP Address and the port number of the TR-2100.

Enter the following at the command prompt or use the appropriate commands for whatever Telnet client you are using.

```
C:\>telnet 192.168.2.245 9999
```

Notice that this address is not routable according to the table of Reserved IP Addresses For Private Networks on page 24, and therefore is only accessible from the local network.

Behind A Firewall

If the TR2100 is behind a firewall you must use the firewall's IP address and configure the firewall to forward port 9999 to the TR-2100.

Telnet Logon

Logging into the TR-2100 through Telnet should connect you to the Interactive Monitor Port. Once connected, you will be prompted for a User Name and Password. If the TR-2100 is new, or has had a Factory Reset done, the User Name is **AAA** (not case sensitive) and the Password is **aaa** (case sensitive).

Figure 50 Telnet Logon

Once logged into the TR2100 the Telnet Configuration Starting Page, containing all the other configuration pages, is displayed.

Connecting With a Terminal Emulator

To start the Interactive Monitor from the Control Serial Port, connect your computer to the TR-2100 as described in section Configuration with an RS-232 terminal emulation program on page 9. Open a terminal program such as HyperTerminal of HyperACCESS at the correct baud rate. If Omnitronix commands are enabled type SETUP followed by the Enter Key. If MDR-2000 commands are enabled type **'^V' IM** followed by the enter key. '^V' is the character generated from the keyboard by pressing the 'V' key while the 'Ctrl' key is held down. There is no requirement for a user name and password for local serial port connection to the TR-2100.

Recommended Terminal Settings

When communicating with the TR-2100, the following settings are recommended for terminal emulation programs and Telnet client programs:

Emulation: ANSI or TTY

ASCII Set-up: ASCII Sending:
Send line ends with line feeds – Disabled
Echo typed characters locally – Disabled
ASCII Receiving:
Append line feeds to incoming line ends – Disabled
Force incoming data to 7-bit ASCII – Disabled

Com Port Settings: Configure
Bits per second – as per Control Port setting in TR2100
Data Bits – 8

Parity – None
Stop bits – 1
Flow Control - None

Interactive Monitor Menu Tree

```
1 - Configure IP
          1 - IP Address: 209.121.70.248
          2 - IP Mask: 255.255.255.0
          3 - Default Gateway: 209.121.70.1
          4 - Primary DNS Server: 209.121.70.5
          5 - Secondary DNS Server: 209.121.70.19
          6 - Alternate DNS Server: 0.0.0.0
          7 - Host Name: TDEB000
          8 - Domain: telcomresearch.com
          9 - DHCP is Enabled
         10 - Clear Reverse ARP Address 0.0.0.0
2 - Configure TCP
         1 - WEB Configuration Port: 80
         2 - Interactive Monitor Port: 23
         3 - TCP Data Retrieval Port: 56789
         4 - TCP Echo on Data Retrieval Port is Disabled
         5 - TCP ECHO Service Port: 7
         6 - TCP CHARGEN Service Port: 19
         7 - TCP Timeout: 600 seconds
         8 - Interactive Monitor Timeout: 300 seconds
         9 - Data Retrieval Port Timeout: 60 seconds
         10- TCP ECHO Timeout: 60 seconds
         11- TCP CHARGEN Timeout: 60 seconds
3 - Configure TCP/IP Security
          1 - Network 1: 0.0.0.0
          2 - Mask 1: 0.0.0.0
          3 - Network 2: 0.0.0.0
          4 - Mask 2: 0.0.0.0
          5 - Network 3: 0.0.0.0
          6 - Mask 3: 0.0.0.0
          7 - Network 4: 0.0.0.0
          8 - Mask 4: 0.0.0.0
          9 - Network 5: 0.0.0.0
         10 - Mask 5: 0.0.0.0
         11 - Network 6: 0.0.0.0
         12 - Mask 6: 0.0.0.0
         13 - TCP/IP Filtering is Disabled
4 - FTP Push Configuration
          1 - FTP Server: FTPTest.TelcomResearch.com
          2 - FTP Directory: /Call Records/Work
          3 - Base File Name: TFEDCBA
          4 - File Extension: txt
          5 - Upload Interval (minutes): 480
          6 - Upload Compressed is Disabled
          7 - Upload When Empty is Enabled
          8 - Upload When 25% Full
          9 - FTP Port on Server: 21
         10 - Automatic Upload is Enabled
         11 - Delete Uploaded Records is Enabled
         12 - FTP User Name: FTPTest
         13 - FTP Password: FTPTest
5 - Site and Collection Configuration
         1 - Collection Method: 0 - RS-232
         2 - End of Record Character: 13
         3 - Site Identification: Telcom Research Head Office
         4 - MDR2000 Commands are Enabled
         5 - Omnitronix Commands are Enabled
```

```
           6 - WTI/PollCat Commands are Disabled
           7 - Add Serial Numbers is Disabled
           8 - Add CRC is Disabled
           9 - Add Local Date/Time is Disabled
           10 - Use Short Date/Time Format is Disabled
 6 - User/Password Configuration
           1 - HTTP Configuration User Name: aaa
           2 - HTTP Configuration Password: aaa
           3 - Data Retrieval Port User Name: aaa
           4 - Data Retrieval Port Password: aaa
           5 - Interactive Monitor User Name: aaa
           6 - Interactive Monitor Password: aaa
 7 - Serial Port Configuration
           1 - Control Port BAUD Rate: 38400
           2 - Data Port BAUD Rate: 57600
 8 - Time Server Configuration
           1 - Primary NTP Time Server: tick.telcomresearch.com
           2 - Secondary NTP Time Server: time-b.timefreq.bldrdoc.gov
           3 - Time Zone Index: 83
           4 - Daylight Time is Enabled
           5 - Synchronize Every 12 Hours
 9 - Configure Ethernet
           1 - Ethernet Full Duplex is Enabled
           2 - Extended Range is Disabled
10 - Network and Serial Port Statistics
           The buffer is empty
           Ethernet bytes received: 8,372,914 sent: 96,006
           Ethernet frames received: 109,555 sent: 673
           Data Port bytes received: 0 sent: 0
           Control Port bytes received: 7,077 sent: 7,137
           Up for 1 days, 20 hours and 3 minutes
           The last time correction was 0 seconds
11 - Display DHCP Information
           DHCP State is BOUND
           IP Address: 209.121.70.127
           IP Mask: 255.255.255.0
           Default Gateway: 209.121.70.1
           Domain: telcomresearch.com
           DNS (Name) Servers: 209.121.70.5
                               209.121.70.19
                               66.203.199.203
           NTP (Time) Servers: 132.246.168.164
                               209.87.233.53
           Renewal Time (T1) 3 days, 12:00:00
           Rebinding Time (T2) 6 days, 3:00:00
           Lease Time Value 7 days, 0:00:00
           Lease Time Used 1 days, 20:04:28
           DHCP Server: 209.121.70.4
12 - Version Information
           Serial Number: 16702650
           Uncompressed Buffer Capacity: 4,063,488 bytes

           Software Revision: 3.02
           Software Build Time: 16:42:06
           Software Build Date: Feb 13 2007

           Hardware Revision: 5.01
           Hardware Build Time: 23:15:42
           Hardware Build Date: Feb 12 2007
13 - Reset to FACTORY DEFAULTS
14 - Restore PREVIOUS SETTINGS
15 - EXIT, SAVING CHANGES
 0 - EXIT WITHOUT saving changes
```

Configuration Starting Page

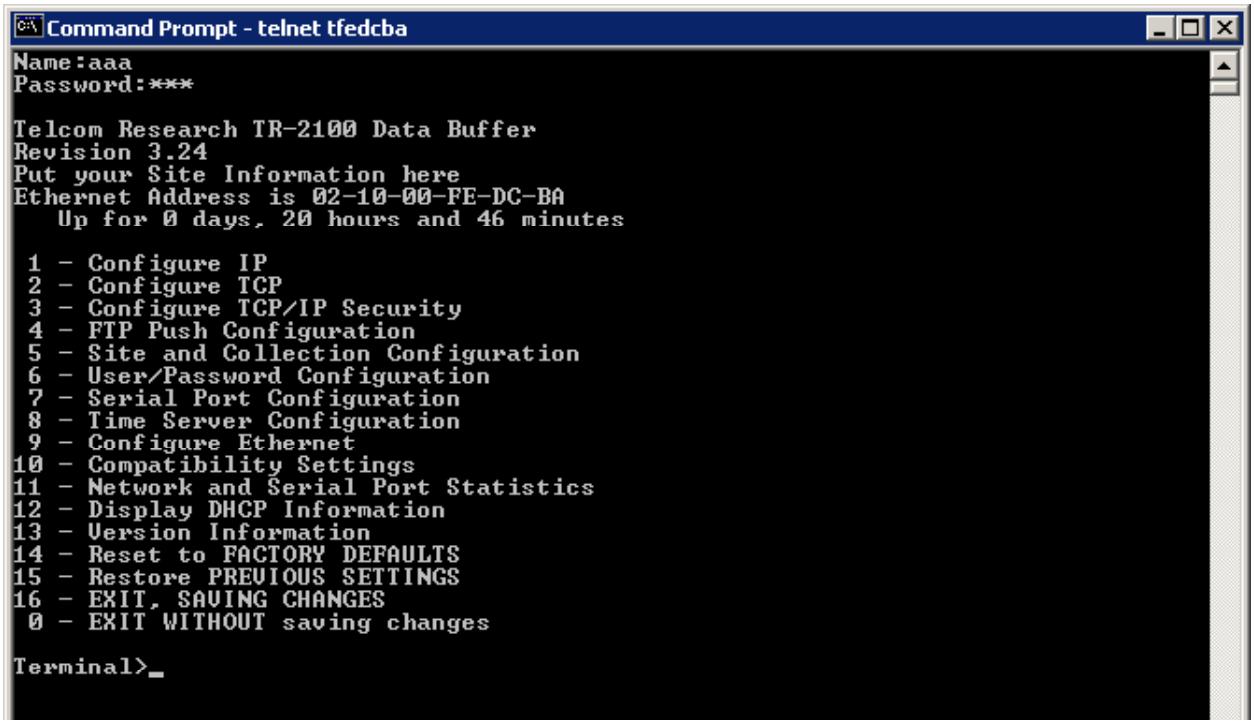


Figure 51 Configuration Starting Page

Note: The Interactive Monitor behaves identically through either the serial port connection or the Telnet connection. The only exception is that while in the Interactive Monitor through the serial port ***all other access to the TR-2100 except for Data Collection is blocked.*** *This includes Telnet access to the Interactive Monitor, Telnet access to Data Retrieval and WEB Configuration as well as the TCP/IP diagnostic protocols (ECHO and CHARGEN). Ping and NetBIOS Name Resolution are also not blocked.*

The timeout specified for TCP Telnet Configuration in the TCP settings is used for the Interactive Monitor when connected through the serial port.

None of the changes you make using Interactive Monitor are applied until you select 16 from the Main Menu. To discard all of your changes and leave the Interactive Monitor, select 0 from the Main Menu.

Note: When you are changing an individual parameter, if you only press Enter and type no value the original value will be retained.

To select one of the pages listed, enter the page number and press ↵ (the Enter key).

Configure IP

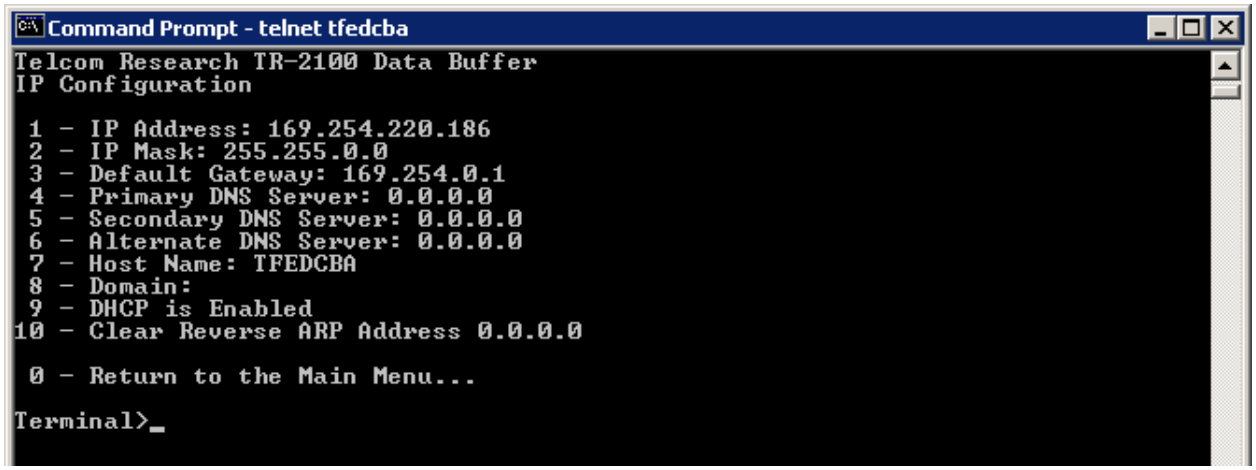


Figure 52 IP Configuration Page

To set the IP parameters manually follow the same instructions for determining and entering the values as described in the section Setting the IP Parameters Manually on page 23.

Configure TCP

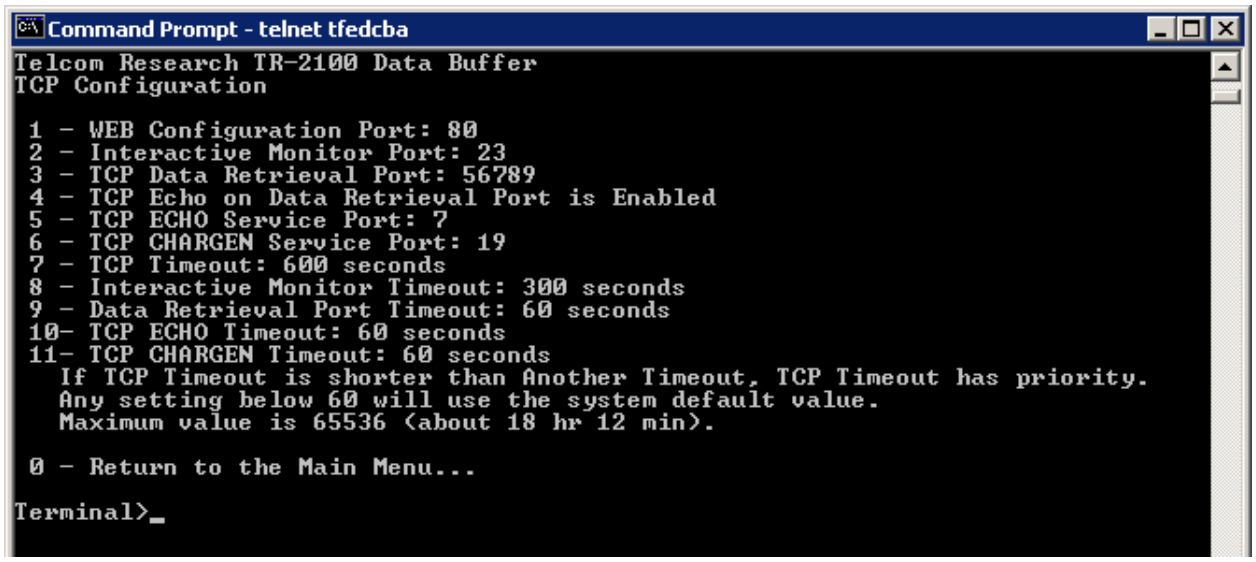


Figure 53 TCP Configuration Page

To set the TCP parameters follow the same instructions for determining and entering the values as described in the section Setting the IP Parameters on page 25.

Configure TCP/IP Security

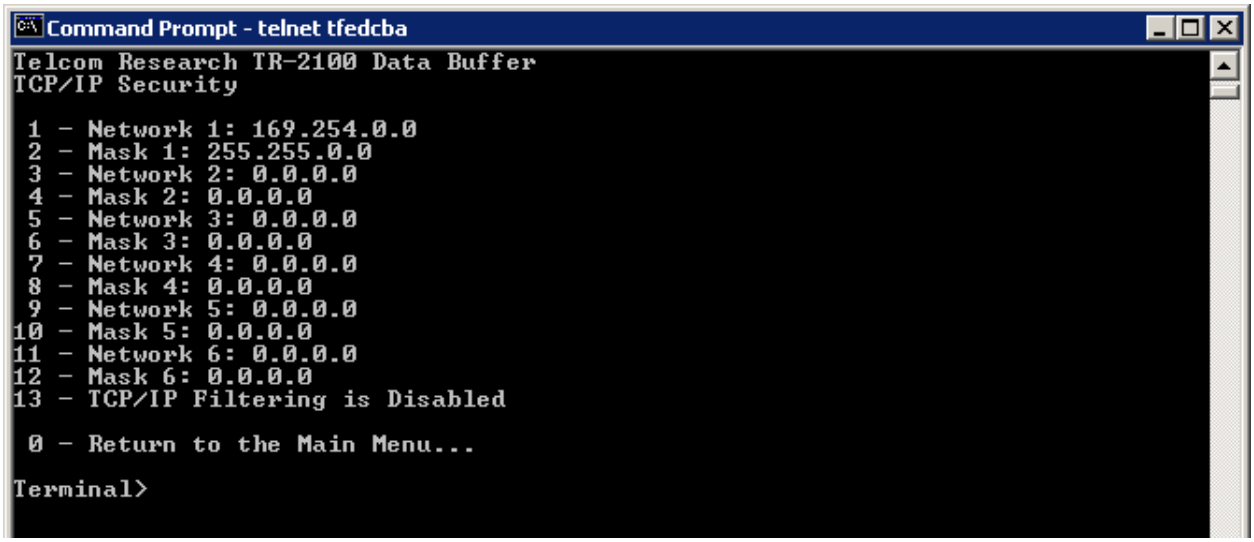


Figure 54 Configure TCP/IP Security

FTP Push Configuration

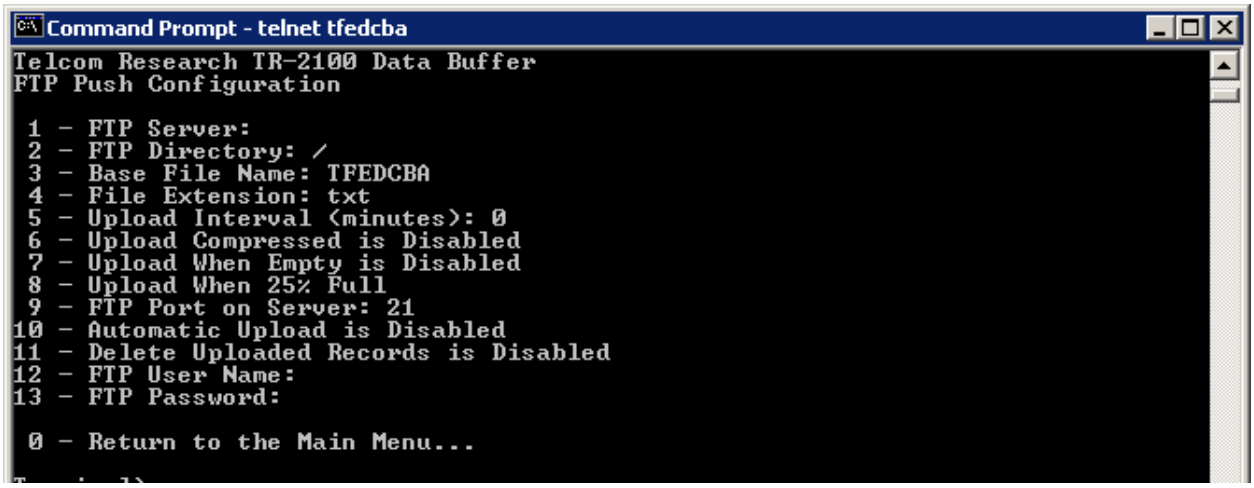


Figure 55 FTP Push Configuration

Site and Collection Configuration

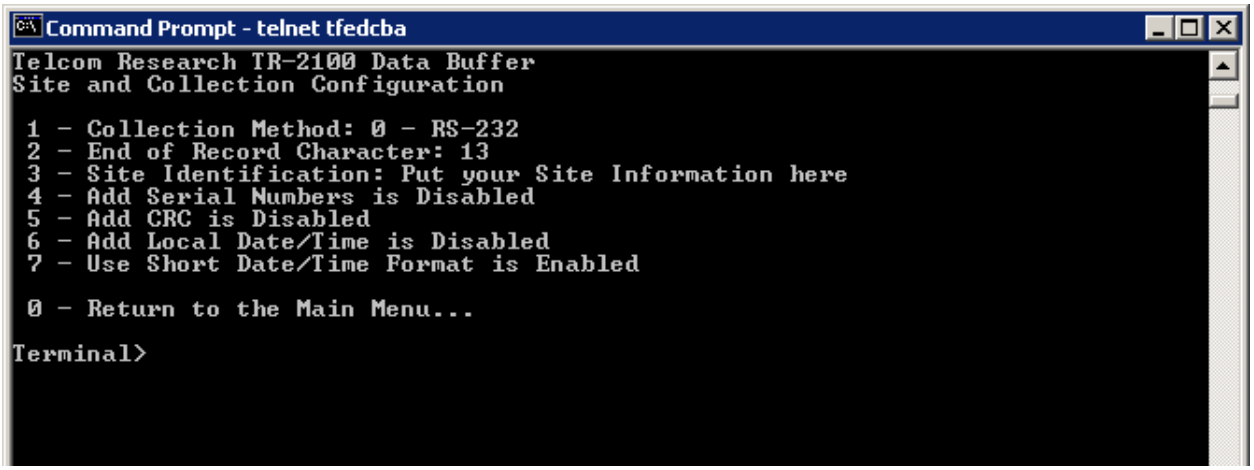


Figure 56 Site and Collection Configuration

User/Password Configuration Page

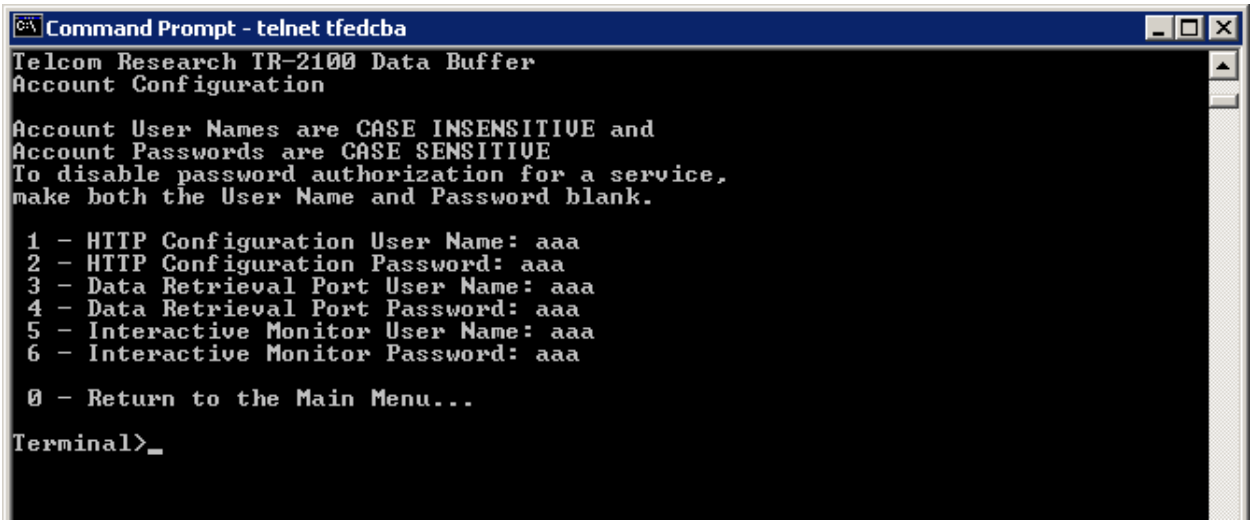


Figure 57 Account and Security Configuration Page

All Internet connections to the TR-2100 can require password authentication. We strongly advise using passwords to restrict access to the TR-2100. User names and passwords may be 1 to 16 characters long. If the User Name or Password field is blank then no authentication is performed and the user will not be presented with a logon request. Only the Password field is case sensitive.

Serial Port Configuration

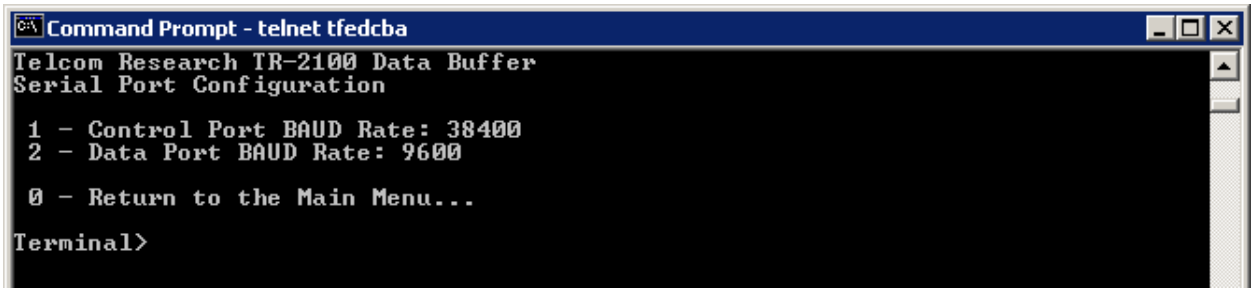


Figure 58 Serial Port Configuration Page

This page allows you to set baud rates for the CONTROL PORT and the DATA PORT. Enter 1 for the CONTROL PORT or 2 for the DATA PORT and press Enter. Next enter the decimal value of the desired baud rate, from 1200 to 115,200.

The new baud rates do not take effect until you exit from the main menu with the Save Changes option.

Time Server Configuration

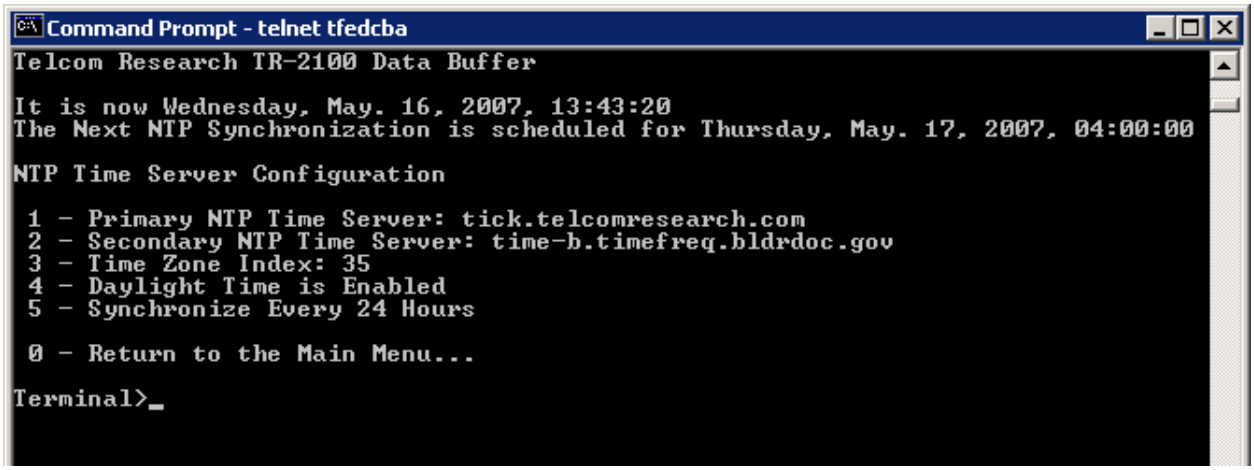


Figure 59 Time Server Configuration

Configure Ethernet

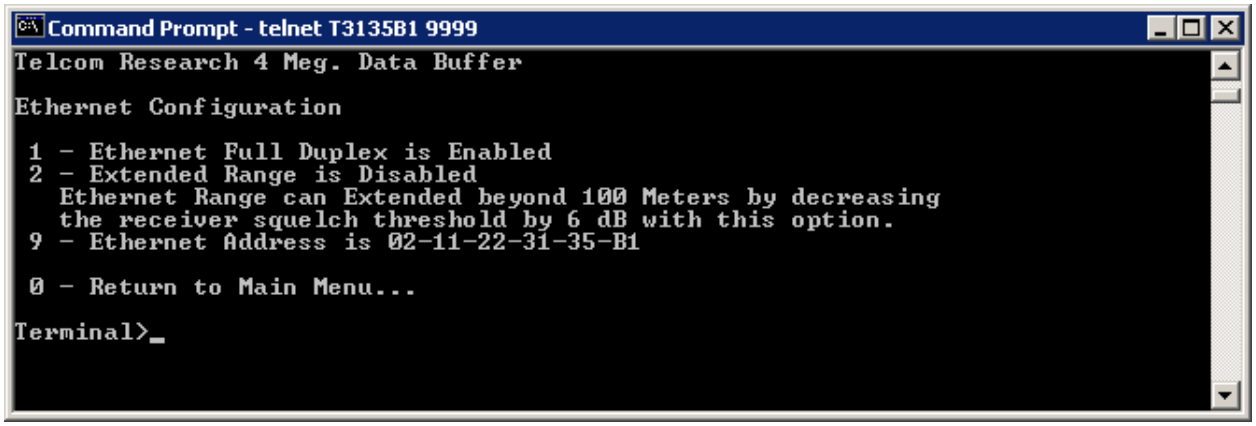


Figure 60 Ethernet Configuration Page

This page contains only 2 settings.

Use Full Duplex

This effectively doubles the network throughput by allowing simultaneous transmission and reception. The majority of network hubs in use today support this.

Allow Extended Cable Length

This allows the TR-2100 to operate with cables that are longer than 100 meters, which is the maximum length specified by the Ethernet standard. The exact additional distance depends on the quality of the cable and the amount of electromagnetic noise in the surrounding environment.

Compatibility Settings

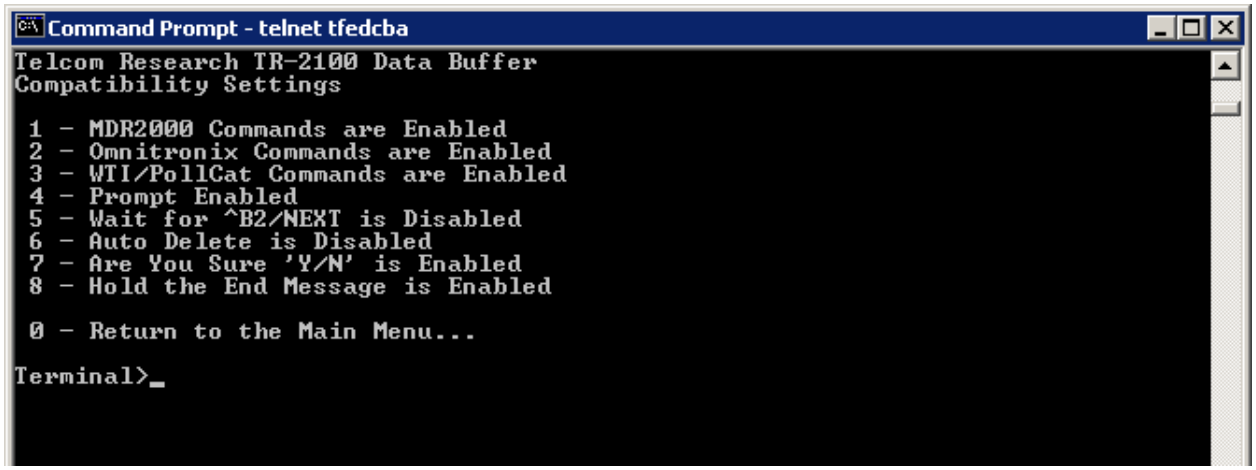


Figure 61 Compatibility Settings

Network and Serial Port Statistics

Figure 62 Network and Serial Port Statistics

This page shows various statistics from the TR-2100. The illustration above shows the information available.

Display DHCP Information

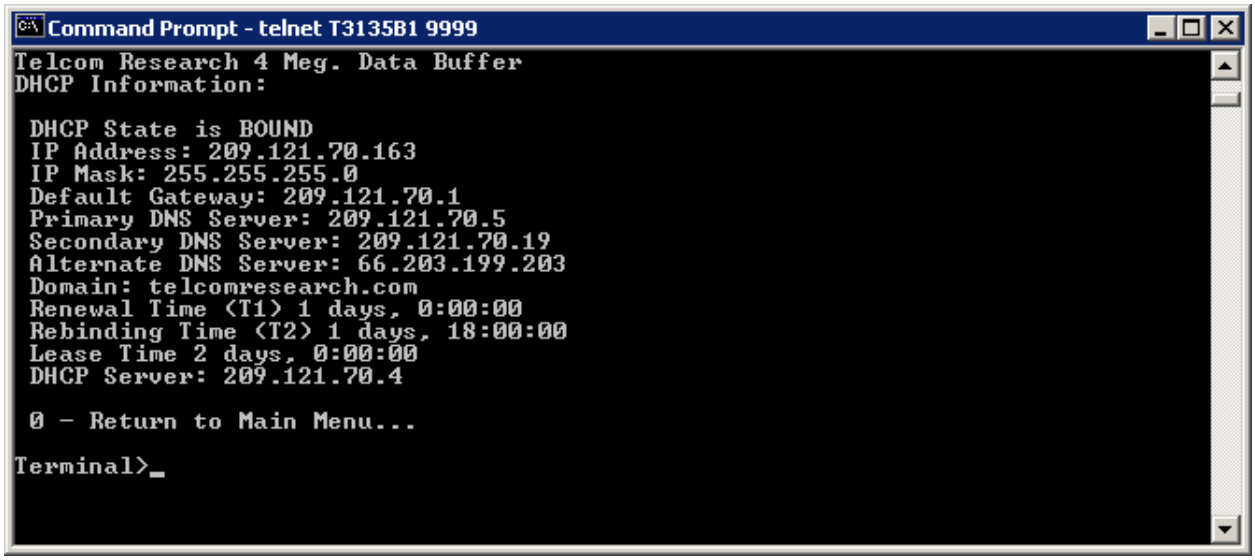


Figure 63 DHCP Information

If DHCP configuration is enabled, this page shows the current DHCP state and the DHCP parameters assigned to the TR-2100 by the DHCP Server. The IP address of the DHCP server is displayed on this page also.

Version Information

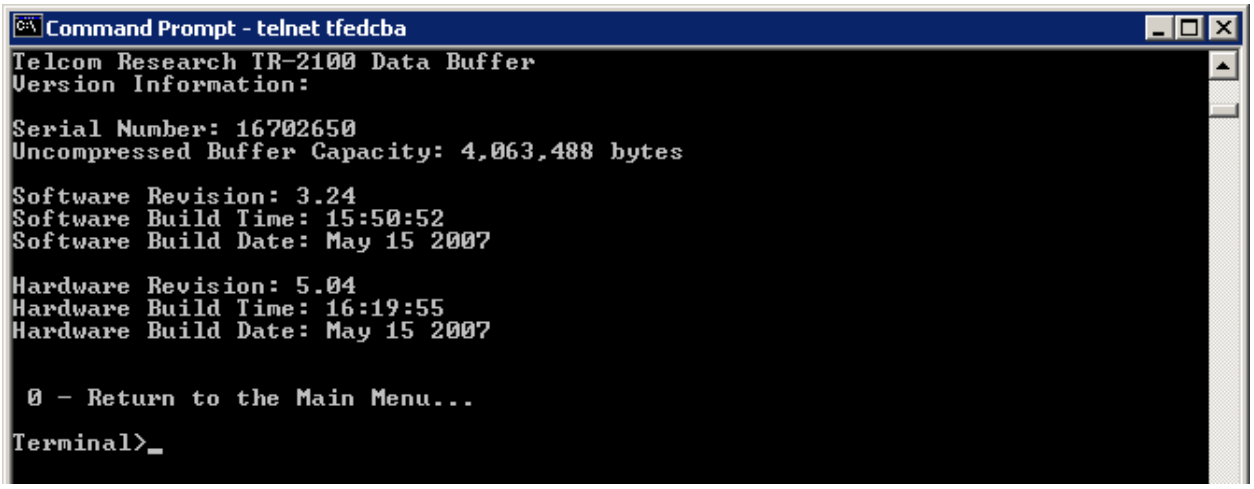


Figure 64 Version Information

Reset to FACTORY DEFAULTS

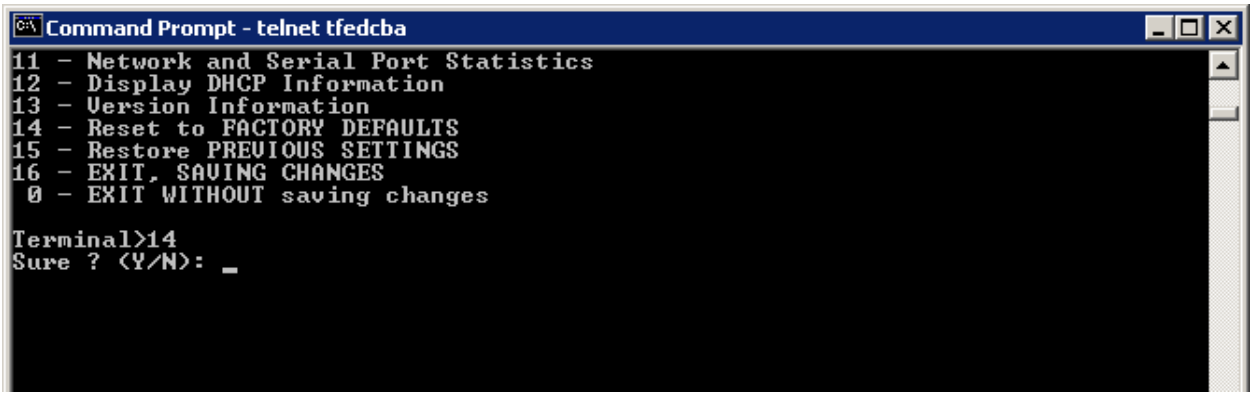


Figure 65 Reset to FACTORY DEFAULTS

Restore PREVIOUS SETTINGS

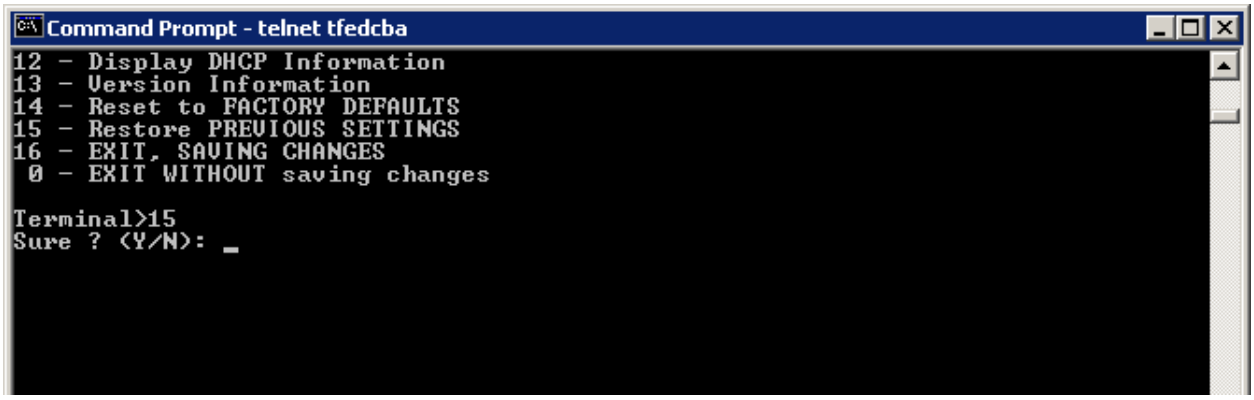


Figure 66 Restore PREVIOUS SETTINGS

EXIT, SAVING CHANGES

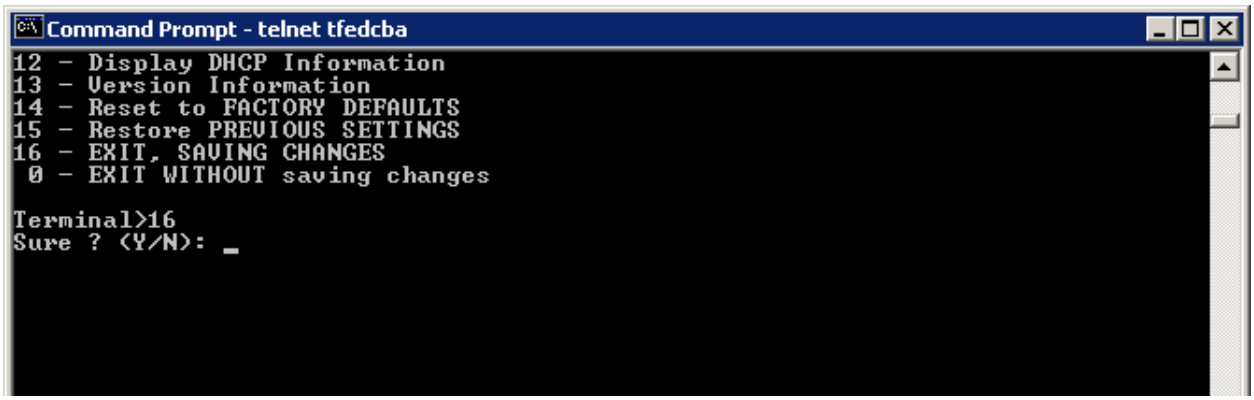


Figure 67 EXIT, SAVING CHANGES

EXIT WITHOUT saving changes

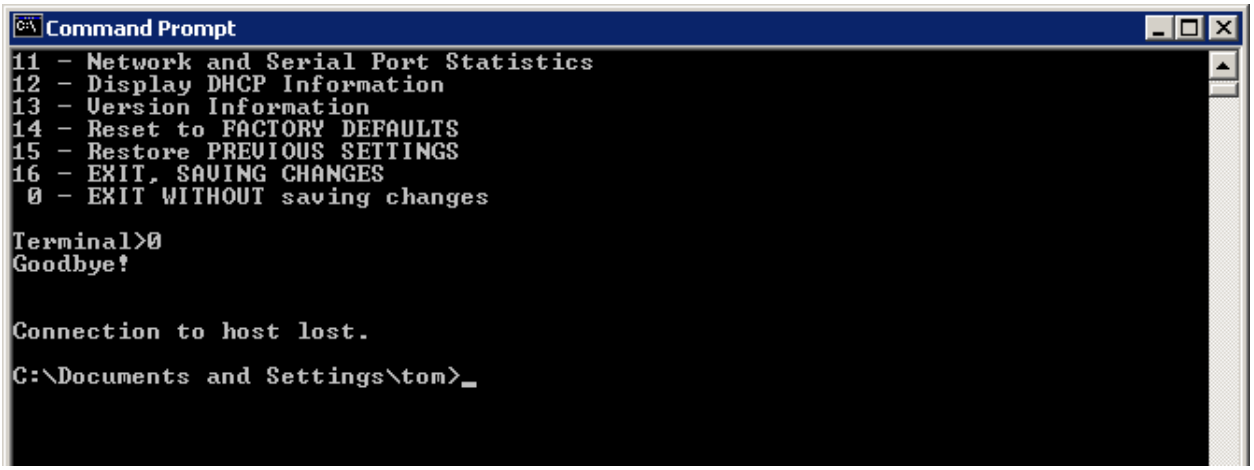


Figure 68 EXIT WITHOUT saving changes

Chapter 10

Reverse ARP Configuration

Reverse ARP is a method of assigning an IP address to the TR-2100 when it is not practical to use the Control Serial Port. It requires an Ethernet connection, the Ethernet address of the TR-2100 and a Telnet client running on a Windows, Linux or Unix computer.

Note: This method is the most difficult and should rarely if ever be utilized. We have included it for completeness.

The following directions should work on Windows, Unix and Linux systems.

Physically connect the TR-2100 to your network as described in the Installation chapter, which starts on page 9.

You will need to obtain an IP address and network mask (and possibly a gateway IP Address) from your network administrator before you can set up your TR-2100 Ethernet Port with this method.

Find the IP address of your computer. Utilities such as IPCONFIG or WINIPCFG are useful in obtaining this information.

Locate the Ethernet address of the TR-2100, which is on the underside of the case, the number will resemble the following: 02-11-22-71-32-33. This is known as the Media Access Control (MAC) address.

Obtain an IP address in your address domain (i.e. 192.168.2.245). Ensure that the TR-2100 is connected to the same LAN segment as your computer (i.e. there is no bridge, router or gateway between your computer and the connection you will be using to configure the unit.

Start a Command Shell from your operating system so that you can enter the following commands directly. The symbol "↵" denotes the Enter Key.

Note: To open a command prompt in Windows, click Start, point to Programs, point to Accessories, and then click Command Prompt

The following examples use fictitious addresses for illustrative purposes only (substitute your real addresses as appropriate) as follows:

Computer IP: 192.168.2.64 TR-2100 IP: 192.168.2.245

TR-2100 MAC: 02-11-22-71-32-33

Note: in Unix derived systems MAC addresses are usually formatted as six pairs of hexadecimal digits separated by colons whereas Windows uses dashes.

Checking Address availability

To check that the IP address is not already in use, enter the following at the Command Prompt:

Using PING

```
C:\>ping 192.168.2.245
```

When a 'Ping" command is used, a 'Request Timed Out' message will be displayed if the address is not currently in use. It should be available to be used for the TR-2100.

```
Pinging 192.168.2.245 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.245:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Use Address Resolution Protocol (ARP) to statically map the Ethernet address by issuing this command:

Windows ARP Command

The Windows ARP command uses dashes to separate digit pairs in the Ethernet address:

```
C:\>ARP -s 192.168.2.245 02-11-22-71-32-33 192.168.2.64
```

Linux or Unix ARP Command

The Linux and Unix ARP command uses colons to separate digit pairs in the Ethernet address:

```
User$>ARP -s 192.168.2.245 02:11:22:71:32:33 192.168.2.64
```

Enter the following command and confirm that the ARP entry has been accepted:

```
C:\>ARP -a
Interface: 192.168.2.64 on Interface 0x1000003
  Internet Address      Physical Address      Type
  192.168.2.245         02-11-22-71-32-33     static
```

The TR-2100 IP address and MAC address should be displayed as above.

Connecting with Telnet

Telnet can now be used to communicate with the TR-2100 to configure the network parameters.

The TR-2100 is now ready to be configured. Please refer to the chapter TR-2100 Interactive Monitor, page 67, for further details on how to do this using Telnet.

Connecting with a WEB Browser

Configuration of the TR-2100 can also be completed using a Web Browser. In the address bar enter http://name, where name is the host name on the bottom of the TR-2100. The User Name and Password are the same as in the Telnet example above

Refer to the earlier chapter TR-2100 Web Configuration on page 51 for further details on configuring the TR-2100 using this method.

Once configured, using either method, it is imperative that the static ARP table be removed from the computer.

Clearing the ARP entry from your Computer

The following two commands are used to clear the static ARP table. The first command will clear the table and the second command will verify that it has been cleared.

```
C:\>ARP -d *
C:\>ARP -a
No ARP Entries Found
```

Clearing the Reverse ARP Address from the TR-2100

The Reverse ARP address of the TR-2100 can be cleared by cycling the power or by using the WEB Interface.

Chapter 11

Collecting Data from the TR-2100

Collecting Data from the TR-2100 can be done 3 ways. They are:

- Automatic FTP Upload
- From the Control Port through a modem or direct PC connection
- From the Telnet Data Retrieval Port

Both the Control Port and the Telnet Data Retrieval Port support the same commands for data retrieval. There are some minor differences and these will be pointed out. Both ports support the MDR-2000 Compatible Commands described on page 107, the Additional MDR-2000 style Commands described on page 109, the Omnitronix Data-Link Compatible Commands described on page 109 and the WTI PollCat Compatible Commands described on page 111

Automatic FTP Upload

This is the quickest and most efficient method of retrieving data from the TR-2100. Please refer to the chapter Automatic FTP Upload on page 89 for details on how to configure the TR-2100 for this method of operation.

From the Control Port

The Control Port does not use any password authentication. This port supports all of the MDR-2000 Compatible Commands described on page 107, the MDR-2000 Compatible Commands described on page 109 and the Additional MDR-2000 style Commands described on page 109.

There is no concept of a ‘connection’ from the control port. It recognizes commands as they are received and acts upon them immediately.

The Baud Rate must be properly set. Refer to Control Port Group figure on page 18 for instructions.

From the Telnet Data Retrieval Port

The Telnet Data Retrieval Port can be configured to require a user name and password. This port supports all of the MDR-2000 Compatible Commands described on page 107,

the Omnitronix Data-Link Compatible Commands described on page 109 and the Additional MDR-2000 style Commands described on page 109 except the following:

- '^V' IM described on page 108. This is the Interactive Monitor. This is available through the Telnet Interactive Monitor Port as described in the chapter TR-2100 Interactive Monitor on page 67

The Telnet Data Retrieval Port uses the concept of a 'connection'. A TCP connection on the appropriate port must be made and an optional user name and password must be supplied. Once these requirements are met the TR-2100 recognizes commands as they are received and acts upon them immediately.

Connecting

A connection is made to the TR-2100 over a TCP/IP network. You must have the IP Address or the host name of the TR-2100. You also must know which TCP port is being used for data retrieval. The default port is 56789. All these settings may be changed locally with the TR-2100 Windows Configuration Program described on page 15, remotely as described in the TR-2100 Web Configuration chapter on page 51 or through the Interactive Monitor (described on page 67) with a Terminal Emulation program running on a PC as described on page 69 or a Telnet Client as described on page 67

Disconnecting

You can close (disconnect) the Telnet session by sending a ^Z (ASCII 26 or hexadecimal 1A) character to the TR-2100.

Chapter 12

Automatic FTP Upload

Automatic FTP Upload is the quickest and most efficient method of retrieving data from the TR-2100. The TR-2100 can act as an FTP client and upload saved records to your FTP server at regular intervals or when a predetermined capacity has been reached. Configuration options include:

- Automatic FTP uploads at a programmable interval from 1 minute to 168 hours and 59 minutes.
- Automatic FTP uploads when the TR-2100 is filled to a preset capacity adjustable from 1% to 90%.
- User chosen FTP file name prefix and extension.
- The FTP server directory can be specified.
- The FTP server can be entered with either a fully qualified domain name or an IP address in dotted decimal notation.
- An arbitrary FTP port can be specified.
- Records that have been successfully uploaded will be automatically deleted from the TR-2100.
- High security. The TR-2100 uses FTP Passive mode and acts as a client. It is not possible to make a connection from an external source to the TR-2100 FTP client.

FTP Server

This is the fully qualified domain name of the FTP server that will receive data records from the TR-2100. It must be 64 characters or less in length and must conform to the rules for ARPANET host names. They must start with a letter, end with a letter or digit, and have as interior characters only letters, digits, and hyphen. The Domain Name must contain the period character '.' to separate sub domains from each other and the root domain as in **ftp.telcomresearch.com**

FTP Directory

This is the name of the directory on the FTP server that the data records will be placed in. This directory must already exist. The TR-2100 will not automatically create it.

File Base Name

This is the first part of the file name to be used when storing records. The full file name is made from this base name, a hyphen, a unique 6-character sequence and the file extension. Assuming a Base Name of 'DataRecord' and an extension of .txt a typical file name would be similar to DataRecord-3NEVRD.txt. The unique 6-character sequence is generated from the time and date and therefore can be used to sort files chronologically.

File Extension

This is the extension of the file name to be used when storing records.

Upload Interval

You can set the time interval in Hours and Minutes between automatic uploads.

Upload When Empty

This is useful for uploading a zero length file at the upload interval to confirm that the TR-2100 is alive and well.

Upload Compressed

To double the speed of uploading you can upload in compressed format and uncompress the data records on the FTP server.

Upload When XX% Full

Set the percentage full point at which you want to upload records. Values below 50% are recommended but you can set it from 1% to 90%.

FTP Port

This is the TCP control port on the FTP server. This is normally port 21 but it may be changed for security reasons. The FTP server automatically assigns the Data Port.

Automatic Upload

This checkbox must be selected to enable upload at the specified interval or Percentage Full programmed. This item is disabled unless an Upload Interval or Percent Full value greater than zero is set.

Delete Uploaded Records

This control is automatically selected if Automatic Upload and either an Upload Interval or Percentage Full value greater than zero are set.

FTP User Name

This is the User Name to send to the FTP server for authentication.

FTP Password

This is the Password to send to the FTP server for authentication.

Chapter 13

Command Sets

The TR-2100 supports three distinct command sets. They are:

- The Telcom Research TR-2100 Native commands used by external software for configuring the TR-2100 and retrieving configuration and status information. These are the commands used by the TR-2100 Windows Configuration Program described on page 15. These commands are only available through the Control Serial Port.
- MDR-2000 emulation commands used for data collection and retrieval. These commands are available through the Control Serial Port and the Telnet Data Retrieval Port.
- The Omnitronix Data-Link compatible commands used for configuration, data collection and retrieval. These commands are available through the Control Serial Port and the Telnet Data Retrieval Port.
- The WTI PollCat compatible commands used for configuration, data collection and retrieval. These commands are available through the Control Serial Port and the Telnet Data Retrieval Port.

The TR-2100 Native commands available at all times, (except when in the Interactive Monitor through the CONTROL PORT), and are intended for automated or computer control. The Interactive Monitor is designed for a human, not a computer program. The MDR-2000 emulation commands, Omnitronix Data-Link and the WTI PollCat compatible commands may be selectively disabled. They are all enabled by default.

TR-2100 Native commands

This is a full set of native commands used to configure the TR-2100.

These commands are **case sensitive** and must be entered exactly as shown. GetBaud0 is not the same as gETbAUD0 or getbaud0.

A CR/LF pair or a single CR (ASCII 13) must end all commands.

All the **GET** commands return a value followed by a single CR (ASCII 13).

Most of the **SET** commands expect one or more values. The **SET** commands return a response of **OK<CR/LF>** when they have completed.

'^T' is the character generated from the keyboard by pressing the 'T' key while the 'Ctrl' key is held down.

There is no space between the '^T' and the name of the command. There is exactly one space between the name of the command and any argument. Numbers may not be specified with embedded commas.

'^T' SetBaud0<space>**115200**<enter> is correct whereas

'^T' SetBaud0<space>**115,200**<enter> is incorrect.

Serial Port Configuration Commands

The following commands are used to configure the serial communications properties of the DATA PORT and the CONTROL PORT.

'^T' GetBaud0

This command gets the baud rate of the CONTROL PORT. The baud rate is returned as a decimal number followed by a CR/LF pair.

'^T' SetBaud0

This command sets the baud rate of the CONTROL PORT. The format is '^T' SetBaud0 BAUD_RATE where BAUD_RATE is the decimal value of the baud rate to set. Any baud rate can be set from 1200 to 115,200.

Note: For 0% baud rate error the baud rate must divide into 460800 leaving no remainder (460800 / BAUD_RATE = whole number). The commonly used PC baud rates (1200, 9600, 28800, 38400, 115200, etc.) meet this requirement.

'^T' GetBaud1

This command gets the baud rate of the DATA PORT. The baud rate is returned as a decimal number followed by a CR/LF pair.

'^T' SetBaud1

This command sets the baud rate of the DATA PORT. The format is '^T' SetBaud1 BAUD_RATE where BAUD_RATE is the decimal value of the baud rate to set. Any standard baud rate can be set. See the comments in *'^T' SetBaud0* above for further details.

'^T' GetSerialDebug

If this command returns 1, the DATA PORT will transmit all Data received or transmitted by the TR-2100 CONTROL PORT. If it is 0 the ports operate normally. For a detailed description see the description of '^T' SetSerialDebug below.

'^T' SetSerialDebug

Setting this to 1 will cause all Data received or transmitted by the TR-2100 CONTROL PORT to be transmitted by the DATA PORT. If data is transmitted to the TR-2100 DATA PORT while in this mode it will still be collected properly. This is used as an aid when developing software for the TR-2100. It allows a developer to

monitor communications between the TR-2100 and the program being developed. It should not be used in normal data collection operation.

IP Configuration Commands

These commands are used to manually configure the IP protocol in the TR-2100. All Internet protocol (IP) addresses including the mask value are sent and returned in decimal notation. For example the Internet address **209.121.70.163** would be sent to the TR-2100 as **3514386083**. The formula for converting this example dotted decimal IP address to decimal is **209 X 16777216 + 121 X 65536 + 70 X 256 + 163**. A detailed description of the Internet Protocols is beyond the scope of this document. Please refer to the Internet Protocol Standards at http://ietf.org/rfc.html for more detailed information. These are called Request For Comments (RFC) for historic reasons but many of them are in fact standards. The same site also has 'Standards', which are collections of the basic RFCs defining the core Internet Protocols.

'^T' GetDHCP

This command tells you if the DHCP client service is enabled on the TR-2100. If it returns 1, DHCP is enabled. If it returns 0, DHCP is disabled.

This is not the same as DHCP state. DHCP state is the current negotiation state of the DHCP service as it relates to a DHCP server. The DHCP state is returned by the GetDHCPInfo command.

'^T' SetDHCP

This command enables and disables the DHCP client service on the TR-2100. An argument of 1 enables DHCP negotiation and configuration and 0 disables DHCP.

'^T' GetDHCPInfo

This command returns several lines of information describing the current state of DHCP negotiation with a DHCP server. Possible states include:

DISABLED, REBOOTING, REBOOTINGWAIT, INIT, SELECTING, SELECTINGWAIT, REQUESTING, REQUESTINGWAIT, BOUND, RENEWING, RENEWINGWAIT, REBINDING and REBINDINGWAIT.

A typical response to this command is:

```
Telcom Research 4 Meg. Data Buffer
DHCP Information:

DHCP State is BOUND
IP Address: 209.121.70.163
IP Mask: 255.255.255.0
Default Gateway: 209.121.70.1
Primary DNS Server: 209.121.70.5
Secondary DNS Server: 209.121.70.19
Alternate DNS Server: 66.203.199.203
Domain: telcomresearch.com
Renewal Time (T1) 1 days, 0:00:00
Rebinding Time (T2) 1 days, 18:00:00
Lease Time 2 days, 0:00:00
```

DHCP Server: 209.121.70.4
OK

A single line containing only ‘OK’ immediately followed by a CR/LF pair terminates the response.

‘^T’ GetIP

Returns the Internet protocol (IP) address manually assigned to the TR-2100. It is returned in decimal notation. For example: an IP address of **209.121.70.163** would be returned as **3514386083**.

‘^T’ SetIP

Sets the Internet protocol (IP) address of the TR-2100. It must be specified in decimal notation. For example: **209.121.70.163** would be sent as **3514386083.**

‘^T’ GetMask

Returns the mask value. The mask is used to distinguish between the host and network portions of an IP Address.

‘^T’ SetMask

Sets the mask value. The mask is used to distinguish between the host and network portions of an IP address. It must be specified in decimal notation. For example: **255.255.255.0** would be sent as **4294967040.**

‘^T’ GetDNS1

Returns the IP address manually assigned to the TR-2100’s primary DNS Server. This server will be the first one queried to resolve a DNS lookup. It is returned in decimal notation.

‘^T’ SetDNS1

Specifies the IP address assigned to the TR-2100’s primary DNS Server. This server will be the first one queried to resolve a DNS lookup.

‘^T’ GetDNS2

Specifies the IP address assigned to the TR-2100’s secondary DNS Server. This server will be the second one queried to resolve a DNS lookup. This server is optional and may be set to 0.0.0.0

‘^T’ SetDNS2

Specifies the IP address assigned to the TR-2100’s secondary DNS Server. This server will be the second queried to resolve a DNS lookup. This server is optional and may be set to 0.0.0.0

‘^T’ GetDNS3

Specifies the IP address assigned to the TR-2100’s alternate DNS Server. This server will be the third one queried to resolve a DNS lookup. This server is optional and may be set to 0.0.0.0

'^T' SetDNS3

Specifies the IP address assigned to the TR-2100's alternate DNS Server. This server will be the third one queried to resolve a DNS lookup. This server is optional and may be set to 0.0.0.0

'^T' GetGateway

This command returns the IP address of the gateway. This is a router, to which all IP traffic having a destination other than the local network, is sent.

'^T' SetGateway

This sets the IP address of the router that is to be used to send IP traffic not destined for the local network.

'^T' GetHost

This is the 'network name' of the TR-2100.

'^T' SetHost

This sets the 'network name' of the TR-2100. To remain compatible with NetBIOS over TCP/IP the length of this name is limited to 16 characters.

'^T' GetDomain

This is the domain to which this TR-2100 belongs. This is used with the Host Name to form the Fully Qualified Domain Name used to find this TR-2100 on your intranet or on the Internet.

'^T' SetDomain

This sets the domain to which this TR-2100 belongs. This is used with the Host Name to form the Fully Qualified Domain Name used to find this TR-2100 on your intranet or on the Internet using the DNS system.

DHCP Assigned Configuration

'^T' GetDHCPIP

Returns the Internet protocol (IP) address assigned to the TR-2100 by a DHCP server. It is returned in decimal notation. For example: **209.121.70.163** would be returned as **3514386083**.

'^T' GetDHCPMask

Returns the Internet protocol (IP) subnet mask assigned to the TR-2100 by a DHCP server. It is returned in decimal notation. For example: **255.255.255.0** would be returned as **4294967040**.

'^T' GetDHCPDNS1

Returns the Internet protocol (IP) address of the primary DNS server assigned to the TR-2100 by a DHCP server. It is returned in decimal notation.

'^T' GetDHCPDNS2

Returns the Internet protocol (IP) address of the secondary DNS server assigned to the TR-2100 by a DHCP server. It is returned in decimal notation.

'^T' GetDHCPDNS3

Returns the Internet protocol (IP) address of the alternate DNS server assigned to the TR-2100 by a DHCP server. It is returned in decimal notation.

'^T' GetDHCPGateway

Returns the Internet protocol (IP) address of the router assigned to the TR-2100 by a DHCP server. It is returned in decimal notation.

'^T' GetDHCPServer

Returns the Internet protocol (IP) address of the DHCP server that supplied the current DHCP settings to the TR-2100. It is returned in decimal notation.

'^T' DHCPGetDomain

Returns the domain name assigned to the TR-2100 by a DHCP server. It is returned as a string. For example: **telcomresearch.com**

TCP Configuration Commands

'^T' GetCfgPort

This command returns the port number used to access the Interactive Monitor through the Telnet protocol.

'^T' SetCfgPort

This command sets the port number used to access the Interactive Monitor through the Telnet protocol.

'^T' GetCfgTimeout

This command returns the timeout used to limit access to the Interactive Monitor through the Telnet protocol. If there is no activity for the specified time (in seconds) the connection will be closed by the TR-2100. This timeout is also used to terminate CONTROL PORT access to the Interactive Monitor.

'^T' SetCfgTimeout

This command sets the timeout used to limit access to the Interactive Monitor through the Telnet protocol. If there is no activity for the specified time (in second) the connection will be closed by the TR-2100. This timeout is also used to terminate CONTROL PORT access to the Interactive Monitor.

'^T' GetCharGenPort

This command returns the TCP port currently assigned to the CHARACTER GENERATOR service. This service is used for network diagnostics and testing. The default value is 19.

'^T' SetCharGenPort

This command sets the TCP port used by the CHARACTER GENERATOR service. This service is used for network diagnostics and testing. The default value is 19.

'^T' GetCharGenTimeout

This command returns the timeout used by the CHARACTER GENERATOR service. If there is no activity for the specified time (in seconds) the connection will be closed by the TR-2100. The default value is 60 seconds.

'^T' SetCharGenTimeout

This command sets the timeout used by the CHARACTER GENERATOR service. If there is no activity for the specified time (in seconds) the connection will be closed by the TR-2100. The default value is 60 seconds.

'^T' GetRetrievalPort

This command returns the TCP port number used to retrieve the TR-2100 collected data through the Telnet Protocol. The default value is 56789.

'^T' SetRetrievalPort

This command specifies the TCP port number used to retrieve the TR-2100 collected data through the Telnet Protocol. The default value is 56789.

'^T' GetRetrievalTimeout

This command returns the timeout (in seconds) used to close the TCP Telnet Protocol data retrieval port of the TR-2100 when there is no activity on that port. The default value is 300 seconds.

'^T' SetRetrievalTimeout

This command specifies the timeout (in seconds) used to close the TCP Telnet Protocol data retrieval port of the TR-2100 when there is no activity on that port. The default value is 300 seconds

'^T' GetEchoRetrieval

Returns the value of the echo setting of the Telnet Data Retrieval Port. If the value is 1 then all commands will be echoed to the sender. If it is 0 this feature is disabled.

'^T' SetEchoRetrieval

This command, with an argument of 1, sets the Telnet Data Retrieval Port to echo all commands it receives. An argument of 0 disables this feature.

'^T' GetEchoPort

This command returns the TCP port currently assigned to the ECHO service. This service is used for network diagnostics and testing. The default value is 7.

'^T' SetEchoPort

This command sets the TCP port currently assigned to the ECHO service. This service is used for network diagnostics and testing. The default value is 7.

‘^T’ GetEchoTimeout

This command returns the timeout used by the ECHO service. If there is no activity for the specified time (in seconds) the connection will be closed by the TR-2100. The default value is 60 seconds.

‘^T’ SetEchoTimeout

This command sets the timeout used by the ECHO service. If there is no activity for the specified time (in seconds) the connection will be closed by the TR-2100. The default value is 60 seconds.

‘^T’ GetHTTPPort

This command returns the port number used to access to the TR-2100’s WEB Configuration Server through the HTTP protocol. The default value is 80.

‘^T’ SetHTTPPort

This command sets the port number used to access to the TR-2100’s WEB configuration server through the HTTP protocol. The default value is 80. Port 80 is the default HTTP port on the Internet. We recommend that you change it as a security measure.

‘^T’ GetHTTPTimeout

This command returns the timeout used to close connections to the TR-2100’s WEB Configuration Server that were not properly closed by a WEB Browser. The default value is 300 seconds.

‘^T’ SetHTTPTimeout

This command sets the timeout used to close connections to the TR-2100’s WEB Configuration Server that were not properly closed by a WEB Browser. The default value is 300 seconds.

‘^T’ GetTCPTimeout

This command returns the TCP timeout used to close connections to TCP ports that are not closed properly. If this time is shorter than a port specific timeout, this timeout has priority. This timeout is also used for any ports that do not have their own programmable timeout. The default value is 600 seconds.

‘^T’ SetTCPTimeout

This command sets the TCP timeout as described above.

Time Server Settings

'^T' SetTimeServer1

This sets the primary NTP timeserver. The entry can be a numeric IP address such as 209.121.70.4 or a fully qualified name like tick.telcomresearch.com.

'^T' GetTimeServer1

Returns the name or IP address if the primary NTP timeserver.

'^T' SetTimeServer2

This sets the secondary NTP timeserver. The entry can be a numeric IP address such as 209.121.70.4 or a fully qualified name like “tick.telcomresearch.com”.

'^T' GetTimeServer2

Returns the name or IP address if the secondary NTP timeserver.

'^T' SetTimeSyncInterval

This sets the interval between clock synchronizations. It is a number representing hours in the range of 1 to 255. If it is set to 0 synchronization will never be attempted.

'^T' GetTimeSyncInterval

Returns the value of SetTimeSyncInterval described above.

'^T' SetTimeZoneIndex

This sets the index that is used to establish the time zone in which the TR-2100 is operating. Some common values are:
4, Pacific Time (US & Canada)
10, Mountain Time (US & Canada)
20, Central Time (US & Canada)
35, Eastern Time (US & Canada)
60, Newfoundland
85, (GMT) Greenwich Mean Time

'^T' GetTimeZoneIndex

Returns the current time zone index. The TR-2100 currently recognizes 75 time zones.

'^T' SyncNTPTime

Causes the TR-2100 to immediately connect a time server and synchronize its clock.

'^T' GetNTPSyncTime

Returns the next time a time synchronization attempt will be made in the following format:
The Next NTP Synchronization is scheduled for Friday, Dec. 01, 2006, 02:00:00

'^T' SetTime

This command will set the TR-2100’s internal clock. The value is the number of seconds since 00:00 (midnight) 1 January 1900 GMT. This is an Internet standard time representation as defined in STD26 at http://www.ietf.org/rfc/std/std26.txt. For example the command <Ctl-T>SetTime 2629584000 would set the time to Saturday, Apr. 30, 1983, 19:00:00 Eastern Standard time or Sunday, May. 01, 1983, 00:00:00 GMT.

FTP Upload (Push) Settings

'^T' SetFTPClientAutoUpload

A value of 1 enables and a value of 0 disables FTP Auto Upload.

'^T' GetFTPClientAutoUpload

Returns the value of FTP Auto Upload described above.

'^T' SetFTPClientDeleteRecords

A value of 1 enables and a value of 0 disables automatically deleting stored records that have been successfully FTP Uploaded.

'^T' GetFTPClientDeleteRecords

Returns the value of the SetFTPClientDeleteRecords setting described above.

'^T' SetFTPClientDirectory

This is the name of the directory on the FTP server that will receive the TR-2100's call records. It can be a maximum of 64 characters long. The directory must exist on the FTP server. The TR-2100 will not automatically create it. See FTP Server Directory for detailed information.

'^T' GetFTPClientDirectory

This gets the name of the directory on the FTP server that will receive the TR-2100's call records.

'^T' SetFTPClientFileBaseName

This is the first part of the file name that will be used to store records on the FTP server. See Base File Name for an explanation.

'^T' GetFTPClientFileBaseName

Returns the first part of the file name that will be used to store records on the FTP server.

'^T' SetFTPClientFileExtension

This is the file extension that will be used to store records on the FTP server. See File Extension for an explanation.

'^T' GetFTPClientFileExtension

Returns the file extension that will be used to store records on the FTP server.

'^T' SetFTPClientInterval

This is the number of seconds between scheduled FTP upload events.

'^T' GetFTPClientInterval

Returns the number of seconds between scheduled FTP upload events.

'^T' SetFTPClientUser

This is the user name that the FTP server is expecting from the TR-2100. The maximum length is 16 characters.

'^T' GetFTPClientUser

Returns the user name that the FTP server is expecting from the TR-2100.

'^T' SetFTPClientPass

This is the password that the FTP server is expecting from the TR-2100. The maximum length is 16 characters.

'^T' GetFTPClientPass

Returns the password that the FTP server is expecting from the TR-2100.

'^T' SetFTPClientPercent

This is a number between 0 and 90 that triggers an automatic FTP upload. See Upload When XX% Full for details.

'^T' GetFTPClientPercent

See the description of SetFTPClientPercent above.

'^T' SetFTPClientPort

This is the TCP port on the FTP server that the TR-2100 should connect to for FTP uploading. See FTP Port for a more detailed explanation.

'^T' GetFTPClientPort

Returns the TCP port on the FTP server that the TR-2100 should connect to for FTP uploading.

'^T' SetFTPCompression

A value of 1 enables and a value of 0 disables compression of FTP uploaded records.

'^T' GetFTPCompression

Returns the value of the SetFTPCompression setting described above.

'^T' StartFTPUpload

This will immediately start an FTP upload if the entire FTP configuration is correct.

'^T' GetFTPNextUpload

Returns the next scheduled Automatic FTP Upload time in the following format:
The Next FTP Upload is scheduled for Thursday, Nov. 30, 2006, 22:13:58

'^T' SetFTPServer

This is the fully qualified domain name or the IP address if the FTP server that the TR-2100 should connect to for FTP uploading.

'^T' GetFTPServer

This command returns the name or the IP address if the FTP server that the TR-2100 should connect to for FTP uploading.

'^T' SetFTPTimeout

This sets the TCP timeout for connections to the FTP server. It is in seconds. Refer to Setting the TCP Timeouts for further details.

'^T' GetFTPTimeout

Returns the TCP timeout for connections to the FTP server in seconds.

'^T' SetUploadEmpty

A value of 1 enables and a value of 0 disables uploading of empty records.

'^T' GetUploadEmpty

Returns the value set by SetUploadEmpty above.

TCP/IP Security Configuration Commands

'^T' SetEnableIPSec

This command enables and disables TCP/IP security filtering. A value of 1 enables address and subnet mask checking and a value of 0 disables this checking.

'^T' GetEnableIPSec

This returns the current setting of TCP/IP security filtering.

'^T' SetSecIPx

When TCP/IP security filtering is enabled, TCP connections from this address combined with the accompanying subnet mask (specified by SetSecMaskx below) will be accepted.

Incoming connection requests are compared to these addresses (as qualified by the masks as described below) until a match is found.

X is a number between 1 and 6 as in '^T' SetSecIP2.

'^T' GetSecIPx

Returns the value of the TCP/IP security filtering address described above.

'^T' SetSecMaskx

This mask is used to qualify the IP address of attempted incoming TCP connections. The IP address from the corresponding '^T' SetSecIPx filter is masked with this value and the connecting address is also masked with this value. If the results are identical to each other the connection is allowed.

X is a number between 1 and 6 as in SetSecMask5.

'^T' GetSecMaskx

Returns the value of the TCP/IP security-filtering mask described above.

Users Security Configuration Commands

All passwords and user names may be up to 16 characters long. A blank user name or password will bypass the connection authentication sequence and the user will not be

prompted for either a User Name or a Password. Only the Password field is case sensitive.

‘^T’ GetCfgName

This gets the user name for access to the Interactive Monitor through the Telnet Interactive Monitor Port.

‘^T’ SetCfgName

This sets the user name for access to the Interactive Monitor through the Telnet Interactive Monitor Port.

‘^T’ GetCfgPass

This gets the password for access to the Interactive Monitor through the Telnet Interactive Monitor Port.

‘^T’ SetCfgPass

This sets the password for access to the Interactive Monitor through the Telnet Interactive Monitor Port.

‘^T’ GetHTTPName

This gets the user name for access to the WEB Configuration Server through the HTTP protocol.

‘^T’ SetHTTPName

This sets the user name for access to the WEB Configuration Server through the HTTP protocol.

‘^T’ GetHTTPPass

This gets the password for access to the WEB Configuration Server through the HTTP protocol.

‘^T’ SetHTTPPass

This gets the password for access to the WEB Configuration Server through the HTTP protocol.

‘^T’ GetPollName

This gets the user name for access to the Telnet server used to collect data from the TR-2100.

‘^T’ SetPollName

This sets the user name for access to the Telnet server used to collect data from the TR-2100.

‘^T’ GetPollPass

This gets the password for access to the Telnet server used to collect data from the TR-2100.

‘^T’ SetPollPass

This gets the password for access to the Telnet server used to collect data from the TR-2100.

Buffer Configuration Commands

'^T' SetEnableMDR2000

1 enables and 0 disables recognition of the MDR command set.

'^T' GetEnableMDR2000

Gets the value of the MDR-2000 command set recognition described above.

'^T' SetEnablePollCat

1 enables and 0 disables recognition of the WTI/PollCat command set.

'^T' GetEnablePollCat

Gets the value of the WTI/PollCat command set recognition described above.

'^T' SetEnableOmnitronix

1 enables and 0 disables recognition of the Omnitronix command set.

'^T' GetEnableOmnitronix

Gets the value of the Omnitronix command set recognition described above.

'^T' SetCollectMode

This sets the date collection mode for the TR-2100. The following values are recognized:

- 0 = RS-232C on Data Port
- 1 = Generic Plain ASCII Text as TCP/IP Server on Port 2301
- 2 = Avaya Session Layer Protocol (Definity RSP) on the Port specified by the SetAvayaPort command.

'^T' GetCollectMode

Reports the value set by the SetCollectMode above.

'^T' SetSiteID

This is a message that will identify a particular TR-2100 installation. It shows up in several places (WEB configuration, this program, etc.) to help you verify that you are working on the correct TR-2100. The message can be up to 64 characters long.

'^T' GetSiteID

Retrieves the value set by the SetSiteID command above.

'^T' SetAvayaPort

Sets the TCP Port that the Avaya Secure Session Protocol will use.

'^T' GetAvayaPort

Gets the TCP Port that the Avaya Secure Session Protocol will use.

'^T' SetEORChar

This is the character that the TR-2100 recognizes as marking the end of a record. The default value is a Carriage Return (CR - 0x0D - 13 - Control-M). Another common selection is a Line Feed (LF - 0x0A - 10 - Control-J). Both of these are treated as special cases in the following way. During data collection all control characters (ASCII valued below 32) are discarded before the records are compressed stored. During data retrieval the records are expanded and the End of Record Character is added back. If the End of Record Character is either a Carriage Return or a Line Feed the combination of a Carriage Return followed by a Line Feed is added to the record. Otherwise only a single character (the End of Record Character) is added to the record. It is sent as a decimal ASCII number.

'^T' GetEORChar

Returns the decimal ASCII representation of the End of Record character described above. A Carriage Return (CR - 0x0D - 13 - Control-M) will be sent as “13”.

'^T' SetAddLineNumber

A value of ‘1’ will cause a six-digit number will be inserted at the beginning of all records retrieved. This means that the numbers are added when the records are output from the TR-2100. The line number will be a six-digit number with leading zeros. A value of ‘0’ will not add line numbers.

'^T' GetAddLineNumber

Retrieves the value set by the SetAddLineNumber command above.

'^T' SetAddDateTime

A value of ‘1’ will cause a date and time to be inserted at the beginning of each record collected. This is stored with the record.

'^T' GetAddDateTime

Retrieves the value set by the SetAddDateTime command above.

'^T' SetShortDateTime

A value of ‘1’ will cause the short date and time format to be used if SetAddDateTime is active. A value of ‘0’ will cause the long date and time format to be used.

'^T' GetShortDateTime

Retrieves the value set by the SetShortDateTime command above.

'^T' SetAddCRC

A value of ‘1’ will cause a 2-byte cyclic redundancy check (CRC) to be added to the end of each block or record as it is retrieved. These are not printable characters. They are binary 8 bit values with the high byte first.

'^T' GetAddCRC

Retrieves the value set by the SetAddCRC command above.

'^T' GetDateTime

Returns the current date and time in the following format:
Wednesday, Nov. 29, 2006, 23:07:28

'^T' SetDaylight

Enables recognition of Daylight time. When set to 1 and disables it when set to 0. The current time zone must also recognize Daylight time.

'^T' GetDaylight

Returns the current setting of Daylight time. 1 is enabled and 0 is disabled.

'^T' ClearBuffer

This command permanently erases the contents of the Data Memory.

'^T' FactroyReset

This command resets the TR-2100 to Factory Default Settings. It also clears the Data Memory.

Buffer Status Inquiry Commands

'^T' GetEthernetAddress

Returns the Ethernet address of the TR-2100 in the following format
02-10-00-00-00-CF

'^T' GetBuildInfo

This command generates several lines containing version numbers including serial number, capacity, time and date information about the TR-2100.

'^T' GetCapacity

Reports the capacity of the TR-2100 in bytes. The actual capacity will be 2 or 3 times this figure because records are stored in a compressed format.

'^T' GetSerialNumber

Returns the serial number of the TR-2100

'^T' GetSoftwareBuildDate

Returns the date of the installed TR-2100 firmware revision.

'^T' GetSoftwareBuildTime

Returns the time of the installed TR-2100 firmware revision.

'^T' GetSoftwareRevision

Returns the revision of the installed TR-2100 firmware.

'^T' GetHardwareBuildDate

Returns the date of the installed TR-2100 hardware boot loader.

'^T' GetHardwareBuildTime

Returns the time of the installed TR-2100 hardware boot loader.

'^T' GetHardwareRevision

Returns the revision of the installed TR-2100 hardware boot loader.

'^T' GetResetEvents

This clears the list of reset events kept by the TR-2100. This list is useful for troubleshooting. It lists all events that cause the TR-2100 to restart including Flash Updates, normal power up event, brownouts, commands such as COLDSTART and RESTART, etc.

'^T' ClearResetEvents

This will empty the list of reset events described above.

'^T' ClearStats

This command resets the accumulated statistics that are displayed by the Omnitronix STATUS command, the MDR SS command, the Interactive Monitor Network and Serial Port Statistics command and the TR-2100 Windows configuration Statistics page and the WEB Configuration Statistics WEB Page.

MDR-2000 Compatible Commands

The TR-2100 implements a subset of the most used MDR-2000 control commands.

These commands are **not case sensitive**. '^V' bE is the same as '^V' BE or '^V' Be.

MDR-2000 Compatible Commands utilize a very simple protocol. Each command is preceded by a SYN (ASCII 16H, or ^V) character and terminated by a carriage-return (ASCII 0DH). The commands themselves are all two characters long. Command recognition is keyed on the reception of the SYN character.

Simply typing the SYN character followed by the correct command can eliminate commands partially entered in error. The normal keyboard editing characters such as Delete or Backspace have no meaning. The command does not echo on the user's terminal. This is consistent with the operation under program control, which is the normal case.

The Telnet Data Retrieval Port also supports these commands except '^V' IM described on page 108. This is the Interactive Monitor. This is available through the Telnet Interactive Monitor Port as described in the chapter TR-2100 Interactive Monitor on page 67.

'^V' is the character generated from the keyboard by pressing the 'V' key while the 'Ctrl' key is held down.

'^V' BE

The '**BE**gin' command moves the buffer pointers to the beginning of the current data storage buffer. This command must be used with caution since it may result in duplicate data in the downstream processing facility. There is no reply from the TR-2100 to this command.

'^V' CL

The '**CL**ear' command causes the erasure of data from the beginning, up to but not including the current buffer pointer location. A 'CLR' message is returned when the clear action is complete. The 'CLR' message is encapsulated in the same protocol used for data transmission.

'^V' DB

The '**D**oor **B**ell' command causes an immediate 'HE' response, followed by a Carriage Return/Linefeed pair, from the TR-2100. It is used to ensure that the TR-2100 is active and waiting for commands. This command also cancels an active 'DU' command.

'^V' DU

The '**DU**mp' command causes all data received on the DATA PORT to be immediately output over the CONTROL PORT. Data continues to be collected normally. The data dumped over the CONTROL PORT is unedited. When the Interactive Monitor is activated this command is cancelled. There is no reply from the TR-2100 to this command. Note that execution of the 'IM', 'SD', or 'DB' commands causes cancellation of the dump.

'^V' ID

The '**ID**entification' command outputs information about the TR-2100 including software revision, serial number, and copyright notice. No protocol is used with this output.

'^V' IM

The '**I**nteractive **M**onitor' command invokes the Interactive Monitor. When invoked, an active 'DU' command is cancelled. Data collection proceeds as usual. This command is only available through the Control Serial Port and is available through the Telnet Interactive Monitor Port as described in the chapter TR-2100 Interactive Monitor on page 67

'^V' MR

The '**M**aster **R**eset' command is used to clear the TR-2100 data buffer. This command differs from the MDR-2000 MR command in that it does not cause an immediate hardware reset with the loss of all configuration data. To perform a complete reset, use the TR-2100 Interactive Monitor through the CONTROL PORT or the Telnet Interactive Monitor Port.

'^V' OK

The '**OK**' command is used to advance the buffer pointer to the next logical record in the data storage buffer. There is no reply from the TR-2100 to this command. Retrieving a data record and comparing it to the previously retrieved record can test its successful reception by the TR-2100. If they are the same the 'OK' command was not received by the TR-2100 correctly.

'^V' SD

The '**S**top **D**ump' command cancels the DU command. This command is automatically invoked when the Interactive Monitor is activated. There is no reply from the TR-2100 to this command.

'^V' SM

The '**S**end **M**aintenance' command is used to transmit a TR-2100 maintenance record to the host system. This record is for backward compatibility with the MDR-2000. The record is encapsulated in the same protocol used for data transmission.

'^V' XT

The 'Transmit' command sends the record at the current buffer pointer location in the currently selected data storage buffer. This record is encapsulated in the protocol described in the next section. An 'END' message is returned when the buffer is empty or the pointers have been advanced past the last record in the buffer by the 'OK' command.

Additional MDR-2000 style Commands

These commands are not supported by the MDR-2000 but are based on that general style.

'^V' DA

This command transmits all the records in the buffer in ASCII format as originally received by the DATA PORT. A CR/LF pair terminates each line. You can interrupt the command by sending an ESC (26 or 1B hex) character on the Control or Telnet Data Retrieval Port as appropriate.

'^V' SS

This command displays the Buffer, Network and Serial Port Statistics.

Omnitronix Data-Link Compatible Commands

The following Omnitronix commands are supported. They are supported for backward compatibility with existing data collection software. For a detailed explanation of these commands, please refer to the appropriate Omnitronix literature. Most of the configuration commands are also available as native TR-2100 commands as noted below.

?

See the MDR SS command.

ACCESS

Supported only when the Omnitronix Data-Link command set is enabled.

BYPASS

Supported only when the Omnitronix Data-Link command set is enabled.

CLEAR
See the TR-2100 Clear Buffer command

CLOCK
Displays the date and time settings of the internal real-time clock

COLDSTART
Supported only when the Omnitronix Data-Link command set is enabled.

COUNT
Supported only when the Omnitronix Data-Link command set is enabled.

CRC
See the TR-2100 SetAddCRC and GetAddCRC commands.

DEFAULT
See the TR-2100 Factory Reset command

FREE
See the TR-2100 Get Capacity command

NEXT
Sends the next data record or block.

RESEND
This causes the last block of data sent to be resent.

PROMPT
Supported only when the Omnitronix Data-Link command set is enabled.

PRT
Supported only when the Omnitronix Data-Link command set is enabled.

PUSHTEST
Attempt to connect and upload records to the FTP server specified in FTP push settings.

RESTART
Supported only when the Omnitronix Data-Link command set is enabled.

RL
Supported only when the Omnitronix Data-Link command set is enabled.

RLMODE
Supported only when the Omnitronix Data-Link command set is enabled.

SETUP
See the TR-2100 Interactive Monitor.

STAMP
See the TR-2100 SetAddDateTime and GetAddDateTime command.

STATUS
See the MDR SS command.

TAG
See the TR-2100 SetAddLineNumber and GetAddLineNumber commands.

WAIT

ZAP
Supported only when the Omnitronix Data-Link command set is enabled.

ZERO
Supported only when the Omnitronix Data-Link command set is enabled.

WTI PollCat Compatible Commands
The following WTI PollCat commands are supported. They are supported for backward compatibility with existing data collection software. For a detailed explanation of these commands, please refer to the appropriate WTI PollCat literature. All the WTI PollCat commands begin with ^A or ^B and are followed by one or more numbers. The symbol ^A stands for Control-A, SOH or ASCII 1 and ^B stands for Control-B, STX or ASCII 2. If ^A is used the command echo is turned off and if ^B is used the command is echoed as it is typed. Unless stated otherwise, these commands behave as described in the WTI Pollcat documentation.

^B00
Set/Reset Memory Partition

^B01
Enter Data Read Mode, ^B01[,type][,source][@n][,n]

^B02
Send Next Data

^B03
Display Site ID

^B04
Define Site ID Message

^B05
Define End Character

^B06
Re-Send Last Data

^B13
Display Site ID/Alarm Messages

^B16
Display System Status

^B20
Display Partition Record Count

^B21
Display Remaining Space

^B22
Display Capacity & PBX Baud

^B25
Erase Partition Data

^B26
Display “Separator” Line

^B29
Enter Pass-through Mode

^B30
Exit, Return To Command Mode

^B39
Erase All Data

^B50
Default Parameters

^B52
Enable/Disable Hold End Data

^B54
Enable/Disable Data on ^B01

^B59
Enable/Disable Line ID

^B62
Select Output Format.

^B66

Enable/Disable Time/Date Stamp

^B67

Enable/Disable Auto Delete

^B72

Display Time, Day, Date

^B75

Enable/Disable “SURE? (Y/N)”

^B91

Define Console Port Communication Parameters

^B92

Define PBX Port A Communication Parameters

^B95

Display Program Version

^B97

Define/Display Network Parameters. The following enhancements have been added:

- ^B97,A,IPADDR DNS Server 1 IP Address
- ^B97,B,IPADDR DNS Server 2 IP Address
- ^B97,C,IPADDR DNS Server 3 IP Address
- ^B97,D,ENABLE 1 = Disable, 2 = Enable DHCP

^B98

Reset Network Port

^B99

Download Current Parameters

Chapter 14

Trouble Shooting

When power is applied to the TR-2100, it performs several power on self tests. Random Access Memory (RAM) is tested first. This is a test of every RAM memory location in the TR-2100. During this test the group of LEDs labelled Buffer light green. The test takes under 2 seconds. The second, third and fourth tests verify lock bits and fuse bits in the microprocessor. The fifth test verifies that the Ethernet controller is functioning. The last test verifies that the program code has not been corrupted. During this test all front panel LEDs light red. This test takes about 2 seconds. If any of these tests fail it is a fatal error and the TR-2100 must be repaired. The test failure LED patterns are as below.

Fatal Errors

Unrecoverable failures are reported in the following ways:

RAM Test Failure

If the RAM test fails the group of LEDs labelled Buffer will flash green.

Ethernet Controller Failure

If the Ethernet circuit fails the Run LED will flash red and green. Three separate tests are performed on the Ethernet system. An additional LED lighting along with the Run LED flashing indicates which of these tests failed. They are:

- The DHCP LED lit RED indicates that the TR-2100 was unable to successfully reset the Ethernet controller chip.
- The HTTP LED lit RED indicates that the TR-2100 was unable to read the ID code from the Ethernet controller chip.
- The Cfg. LED lit RED indicates that the Ethernet loop back test failed.

Program Memory Failure

When the Program Memory test fails all 8 front panel LEDs flash red. It may be possible to correct this error. See the next paragraph.

Program Memory Failure Non-Fatal Error

The non-fatal exception is when a flash update is interrupted because of a power failure, communications failure or a computer crash. If the flash update is interrupted the program memory may be left in a corrupt state and the Program Memory Failure

LED pattern described above will appear. This can be corrected by repeating the flash update. Please see Flash Update Errors on page 45 for a detailed explanation.

Microprocessor Configuration Failures

These tests confirm that the microprocessor is configured correctly at power up. These configuration bits are set during manufacturing and are never expected to change.

Lock Bits Group Failure

If the Lock Bits are set incorrectly the Ctrl LED flashes red and green.

Fuse Bits Low Group Failure

If the Fuse Bits Low Group is set incorrectly the Data LED flashes red and green.

Fuse Bits High Group Failure

If the Fuse Bits High Group is set incorrectly the Full LED flashes red and green.

Fuse Bits Extended Group Failure

If the Fuse Bits Extended Group is set incorrectly the Full LED and the Data LED flash red and green.

Non Fatal Errors

Link LED does not light

This indicates that the Ethernet port is not connected. Verify that the cable is plugged in firmly at both ends and the clip has latched. This is can also be caused by a faulty Ethernet cable or the wrong type of Ethernet cable. To connect to an Ethernet hub or switch, use a straight through cable. To connect directly to a computer use a crossover Ethernet cable.

No LEDs light when power is applied

Verify that there is power at the outlet where the TR-2100's power adapter is plugged in. Verify that the power adapter cable is inserted fully into the TR-2100. If there are still no LEDs lighting then either the power adapter or the TR-2100 has failed.

Unable to communicate with the Ctrl Port

If you are using the Telcom Research TR-2100 Windows Configuration Program click the Find Me! Button. This will check every available communications port and baud rate on the computer checking for a connected TR-2100. Make sure that the cable connecting the computer to the TR-2100 is a null modem cable as described in Connecting Directly to a Computer Serial Port on page 9 and Table 3 - 9-pin Port Wiring on page 10.

Unable to receive records on the Data Port

Refer to the section Connecting to the Data Source on page 10 and confirm that the cable wiring is correct for your data source. Ensure that the correct baud rate is set

on the TR-2100 Data Port. When the buffer is empty the Full light on the front panel is solid green. When records have been collected the Full LED flashes according to the patterns described in Table 5 on page 14.

Chapter 15

Factory Default Settings

Factory default settings are the settings in the TR-2100 when it leaves the factory. There is a command available through the Control Serial Port which will restore these settings should it be necessary.

Ethernet Configuration

Use Full Duplex

Default value is ON.

Allow Extended Cable Length

The default value is OFF.

Serial Port Configuration

Control Port Baud Rate

The default value is 38,400 baud.

Data Port Baud Rate

The default value is 9,600 baud.

IP Parameters

IP Address

The default value is a unique address calculated from the Ethernet address. It is in the Private Address block 169.254.0.0 - 169.254.255.255. Please refer to Reserved IP Addresses For Private Networks on page 24 for details.

Subnet Mask

The default value is 255.255.0.0.

IP Gateway

The default value is 169.254.0.1.

Primary DNS Server

The default value is 0.0.0.0.

Secondary DNS Server

The default value is 0.0.0.0.

Alternate DNS Server

The default value is 0.0.0.0.

Host Name

The default value is a unique name calculated from the Ethernet address.

Domain

The default value is empty (no domain name).

Enable DHCP

The default value is DISABLED.

TCP Parameters

HTTP Configuration Port:

The default value is **80**.

Configuration Port:

The default value is **23**.

Data Retrieval Port:

The default value is **56789**.

Echo on Data Retrieval Port:

The default value is **DISABLED**.

TCP ECHO Service Port:

The default value is **7**.

TCP CHARGEN Service Port:

The default value is **19**.

Site and Data Collection Settings

Site Identification

The default setting is “Put your Site Information here”.

End of Record Character

The default value is a Carriage Return (CR - 0x0D - 13 - Control-M).

Data Collection Method

RS-232C Data Port at XXXX Baud

The default setting is enabled.

Generic Plain ASCII Text as TCP/IP Server on Port 2301

The default setting is disabled.

Avaya Session Layer Protocol (Definity RSP) on Port XXXX

The default setting is disabled.

Record Modifications

Add Line Numbers

The default setting is disabled.

Add Record/Block CRC

The default setting is disabled.

Add Local Date/Time

The default setting is disabled.

Short Date/Time Format

The default setting is enabled.

Command Sets

Enable MDR2000 Commands

The default setting is enabled.

Enable Omnitronix Commands

The default setting is enabled.

Enable WTI/PollCat Commands

The default setting is enabled.

Security Parameters

HTTP Configuration User Name

The default value is “AAA”. This is not case sensitive.

HTTP Configuration Password

The default value is “aaa”. This **is** case sensitive.

Telnet Configuration User Name

The default value is “AAA”. This is not case sensitive.

Telnet Configuration Password

The default value is “aaa”. This **is** case sensitive.

Data Retrieval User Name

The default value is “AAA”. This is not case sensitive.

Data Retrieval Password

The default value is “aaa”. This **is** case sensitive.

SNTP (Time Server) Settings

Primary NTP Server

The factory default setting is “tick.telcomresearch.com”.

Secondary NTP Server
The default value is “time-b.timefreq.bldrdoc.gov”.

Time Zone
The default value is Eastern Standard Time in North America, GMT -5 hours.

Automatically Adjust for Daylight Time
The default value is enabled.

Sync every XX Hours
The factory default setting is every 24 hours.

FTP Upload Settings
FTP Server
There is no default setting for this entry. It is empty.

FTP Server Directory
There is no default setting for this “/”. This is the root directory of the FTP server.

Base File Name
The default value is “cdr”.

File Extension
The default value is “txt”.

FTP Port
The default value is 21.

Upload Empty
The default value is disabled.

Compressed
The default value is disabled.

Automatic Upload
The default value is disabled.

Delete Uploaded Records
The default value is disabled.

Upload When XX% Full
The default value is 25%.

Upload Interval
The default value is 0.

FTP User Name
There is no default setting for this entry. It is empty.

FTP Password

There is no default setting for this entry. It is empty.

TCP/IP Security Parameters

Network 1

The default value is 169.254.0.0

Mask 1

The default value is 255.255.0.0

Network 2-6

The default value is 0.0.0.0

Network 2-6

The default value is 0.0.0.0

Enable TCP/IP Filtering

The default vales is disabled.

Chapter 16

Specifications

Specifications for the TR-2100 are presented in this chapter. These specifications were current at the time of publication of this manual but they are subject to revision or change as new features and capabilities are incorporated into the TR-2100.

System Requirements

The following minimum requirements apply to the TR-2100 operating environment.

Hardware Requirements

For using the TR-2100 with TR-2100 Windows Configuration Program, a Pentium 233 MHz (or more) class Personal Computer with the following specifications is recommended:

- 64 MBytes RAM, or more
- 10 MBytes of free hard disk (HD) space
- 16650 Compatible Serial Port (COM port)
- TR-2100 Windows Configuration Program installed
- Acrobat Reader v4.0 or later installed (optional).

Software Requirements

The following operating systems are currently supported by TR-2100 Windows Configuration Program:

- Windows 2000
- Windows XP

The TR-2100 Windows Configuration Program is constantly being updated to add new features and new TR-2100 firmware updates. See http://databuffers.com/ for the latest information.

Operating Conditions

Operation Temperature ---------- 0°C - 70°C

Operating Humidity---------- 10 - 90 % RH (non-condensing)

Supply Voltage ----------8.0V to 16.0V AC or DC (with supplied adapter)

WARNING! Violating the recommended operating conditions for the TR-2100 may cause incorrect operation.

Technical Specifications

Physical Dimensions---------- (H x W x D) 25.4 x 155 x 91.4 mm/1 x 6.8 x 3.6 in

Weight---------- 384 g/13.6 oz.

Input Voltage Requirements ----------8.0V to 16.0V AC or DC (with supplied adaptor)

Current Consumption----------< 260 ma.

Ambient Temperature (Operating) ---------- 0 to +70°C

Ambient Temperature (Non-operating) ---------- -55 to +85°C

Relative Humidity (Non-condensing) (Operating)----------10 to 90%

Relative Humidity (Non-condensing) (Non-operating)----------5 to 95%

Shock----------20 g, 11 ms half sine

Vibration ---------- 5 g

Control Port Serial Communications Speed ---------- 300 to 115200 Baud

Data Port Serial Communications Speed ---------- 300 to 115200 Baud

Flash Memory ---------- 1 to 8M bytes

Connections

Power

Connector ----------9mm Long, 5.5 mm OD/2.5mm ID

Serial Ports

Control Port Serial Connector (RS-232C)---------- 9-pin D-SUB Male

Data Serial Connector (RS-232C)---------- 9-pin D-SUB Male

Network

Ethernet Connector (IEEE 802.3) ----------RJ-45 Female

Indicators

Front Panel

LINK ---------- Green LED

ACT ---------- Red LED

Network LEDs

DHCP---------- Red LED

HTTP ---------- Red LED

Cfg.---------- Red LED

Collect ---------- Red LED

Buffer LEDs

Run---------- Red/Green LED

Full ---------- Red/Green LED

PBX ---------- Red/Green LED

Ctrl ---------- Red/Green LED

Rear Panel

LINK ---------- Green LED

ACT ---------- Red LED

Glossary

Frequently used terms, acronyms and abbreviations with a brief definition of each:

10BaseT
: A 10-Mbps Ethernet specification defined by IEEE 802.3 that uses Category 3 or Category 5 twisted pair wiring.

100BaseT
: A 100-Mbps Ethernet specification defined by IEEE 802.3 that uses Category 5 twisted pair wiring. Designed to integrate with existing networks with minimal disruption. Generically called Fast Ethernet

1000BaseTX
: Ethernet specification for unshielded twisted pair cabling that is used to transmit data at 1 Gbps (gigabits per second) with a distance limitation of 220 meters per segment.

ACCESS CODE
: Number prefix a subscriber dials to reach the nationwide long distance network.

ADDRESS MASK
: A bit mask used to select bits from an IP address. A logical ‘and’ with the mask produces the network portion of the address. Hosts use address masks to determine if a destination IP address represents an adjacent host (allowing direct delivery), or if routing must be employed.

AMA
: Automatic Message Accounting; automatically records the data needed for billing customer-dialed long distance calls.

ANI
: Automatic Number Identification; equipment that automatically records the calling number. This is part of automatic message accounting.

ANONYMOUS FTP (File Transfer Protocol)
: The procedure of connecting to a remote computer, as an anonymous or guest user, in order to transfer public files back to your local computer. (See also: FTP and PROTOCOLS)

AREA CODE
: Three-digit code used in dialling long distance calls from one Numbering Plan Area to another.

ARP (Address Resolution Protocol)
: A network level protocol used to map an IP address to hardware address. IP

addresses are merely an abstraction to make networks hardware independent, a machine must determine the actual address of the destination machine (or the router for the first hop if the destination is not local) before any packets can be sent.

ASYNCHRONOUS

(ASYNC) Serial data is transmitted in one of two ways, synchronous (SYNC) or asynchronous (ASYNC). ASYNC communications involve the use of a start bit to signal the beginning of a character and a stop bit to signal the end of the character.

AUTHENTICATION

The verification of the identity of a person or process.

BROADCAST

A special type of multicast packet that all nodes on the network are always willing to receive. A broadcast message has an IP address with a host portion that is all ones or an Ethernet address consisting of all ones.

BROADCAST ADDRESS

An IP or Ethernet address used to denote a packet that should be received by every host on a network, consisting of the target network address and a host address of all ones (e.g. for a class C network 192.168.36.0 the broadcast address is 192.168.36.255). The Ethernet broadcast address consists of all ones.

CARD DIALER

Automatic pushbutton dialler combined with regular telephone; phone numbers coded on plastic cards are inserted in dialler slot for fast, accurate dialling.

CATEGORY 5

A standards-based cable consisting of twisted-pair wire, with a specific number of twists per foot to reduce electrical crosstalk and provide a specific characteristic impedance (capacitive and inductive reactance) per each foot of cable. Used as an industry standard for modern cable plant, and required for Fast Ethernet. It is desirable for 10BaseT as well. CCITT International Telegraph and Telephone Consultative Committee; an organization that sets standards and promotes worldwide cooperation in communications matters.

CD

(Carrier Detect) A control signal from a DCE device (a modem, for example) indicating that the DCE has recognized another device and that the carrier connection is established. This signal stays on during the entire conversation between the two.

CENTRAL OFFICE

is a switching unit in the telephone network providing service to the general public.

CENTREX

Type of private branch exchange (PBX) that enables incoming calls to be dialed direct to any extension, and lets extension users dial their own calls without switchboard assistance.

CHECKSUM

A computed value which is dependent upon the contents of a packet. This value is sent along with the packet when it is transmitted. The receiving system computes a new checksum based upon the received data and compares this value with the one sent with the packet. If the two values are the same, the receiver has a high degree of confidence that the data was received correctly.

CLIENT

A computer system or process that requests a service of another computer system or process. A workstation requesting the contents of a file from a file server is a client of the file server.

CTS

(Clear To Send) A Control Signal from the DCE that alerts the DTE device that the DCE is ready to receive data.

DCE

(Data Circuit terminating Equipment) An example would be a modem. In a typical RS-232 link a DTE (Data Terminal Equipment) device, such as a PC, talks to a DCE device, such as a modem. DTE and DCE are complimentary interfaces. A DTE device always transmits on pin 2 and receives on pin 3 of a DB25 connector, a DCE device does the opposite.

DDD

(Direct Distance Dialing) is an easy, fast telephone service, which permits customers to dial their own long distance, calls.

DHCP

(Dynamic Host Configuration Protocol) A way to dynamically assign IP addresses, network mask values and DNS name servers. A DHCP server dynamically assigns IP addresses to devices requesting them. These address assignments expire after a time specified by the network manager. The DHCP server then reassigns these addresses to other devices as needed.

DHCP SERVER

A server in a network or Internet service that assigns IP addresses and other required information to multiple stations on a network. See the description of DHCP above.

DID

(Direct Inward Dialling) enables outside calls to be dialed direct to extensions without going through a switchboard

DOD

(Direct Outward Dialing) is the reverse of DID: an extension user dials out without switchboard assistance.

DNS

(Domain Name System) The DNS is a general purpose distributed, replicated, data query service. The principal use is the lookup of host IP addresses based on host names. The Internet naming scheme consists of a hierarchical sequence of names, from the most specific to the most general (left to right), separated by dots. The style of host names now used in the Internet is called "domain name", because they are the style of names used to look up anything in the DNS. Some important domains are: .COM (commercial), .EDU (educational), .NET (network operations), .GOV (U.S. government), and .MIL (U.S. military). Most countries also have a domain. For example, US (United States), .UK (United Kingdom), .AU (Australia). It is defined in STD 13, RFCs 1034 and 1035.

DSR

(Data Set Ready) A Control Signal that is sent by a DCE device indicating to the DTE device that the DCE is ready to transmit or receive data.

DTE

(Data Terminal Equipment) An example would be a PC serial port. In a typical RS-232 link a DTE device, such as a PC, talks to a DCE device, such as a modem. DTE and DCE are complimentary interfaces. A DCE device always transmits on pin 3 and receives on pin 2 of a DB25 connector, a DCE device does the opposite.

DTR

(Data Terminal Ready) A Control Signal sent by the DTE device to the DCE, letting it know that the DTE is ready

ETHERNET

A network protocol invented by Xerox Corporation and developed jointly by Xerox, Intel and Digital Equipment Corporation. Ethernet networks use CSMA/CD and run over a variety of cable types at 10, 100 and 1000 Mbps (megabits per second).

EXCHANGE

Unit of territory for telephone rate purposes; includes city, village or other community and is served by one or more central offices.

FIREWALL

Router, or routers placed between an internal network and an outside network to provide security by filtering packets. Firewalls prevent undesirable activity by preventing certain types of packets passing between the networks. It examines all incoming and outgoing traffic to determine if it may be routed to its destination.

FQDN

(Fully Qualified Domain Name) The FQDN is the full name of a system, rather

than just its hostname. For example, "pigeon" is a hostname and "pigeon.qut.edu.au" is an FQDN.

FTP

(File Transfer Protocol) allows a user to transfer files electronically from remote computers back to the user's computer. Part of the TCP/IP/TELNET software suite.

FULL-DUPLEX

The communication mode in which a device simultaneously sends and receives over the same link, doubling the bandwidth. A full-duplex 100Mbps connection has 200Mbps of bandwidth. A full-duplex 1000Mbps connection has 2000Mbps of bandwidth.

GATEWAY

A routing table entry that is used to direct packets addressed to networks not explicitly listed in the routing table. This is generally a computer that forwards and routes data between two or more networks of any size.

HARDWARE ADDRESS

An addressing scheme used by hardware to identify hosts on a network. Ethernet interfaces use a 48 bit addressing scheme. Each Ethernet interface is given a unique hardware address when manufactured.

HOST NAME

The name given to a machine.

HTTP

(Hypertext Transfer Protocol) is a standard that defines how requests for HTML and graphics files that make up a web page are handled between the web server and the client browser.

ICMP

(Internet Control Message Protocol) is an extension to the Internet Protocol. It allows for the generation of error messages, test packets and informational messages related to IP.

INTERNET

The series of interconnected networks that includes local area, regional, and national backbone networks. Networks in the Internet use the same telecommunications protocol (TCP/IP) and provide electronic mail, remote login, and file transfer.

IP

(Internet Protocol) is the Internet standard protocol that provides a common layer over dissimilar networks, used to move packets among host computers and through gateways if necessary.

IP ADDRESS

The numeric address of a computer connected to the Internet; also called Internet address.

LAYER

Communication networks for computers may be organized as a set of more or less independent protocols, each in a different layer (also called level). The lowest layer governs direct host-to-host communication between the hardware at different hosts; the highest consists of user applications. Each layer builds on the layer beneath it. For each layer, programs at different hosts use protocols appropriate to the layer to communicate with each other. TCP/IP has five layers of protocols; OSI has seven. The advantages of different layers of protocols is that the methods of passing information from one layer to another are specified clearly as part of the protocol suite, and changes within a protocol layer are prevented from affecting the other layers. This greatly simplifies the task of designing and maintaining communication programs.

LAN

(Local Area Network) is a data network intended to provide the ability to connect all the computers, terminals and peripherals etc on a single site or an area of only a few square kilometres or less. Because the network is known to cover only a small area, optimizations can be made in the network signal protocols that permit data rates up to 100Mb/s.

LOCAL CALLING AREA

The area, consisting of one or more exchanges within which calls may be made without a toll charge.

LONG DISTANCE CALL

Any call beyond the local calling area.

MAC ADDRESS

The hardware address of a device connected to a shared media, typically Ethernet.

MASK

See ADDRESS MASK above.

MODEM

(Modulator/Demodulator) is a devices that convert a digital signal to an analog signal. Modems allow computer data (digital) to be transmitted over voice-grade telephone lines (analog).

NAT

Network Address Translation - also called IP masquerade, is a process of translating the source header of IP packets so they will be routable across wide area networks. This allows communication to be established by a device using a translated address but prevents external sources from establishing communication with the device using a translated address. In other words, only outbound connections may be established.

NETWORK

A collection of wires, fibres, and equipment used to effect communication between a number of nodes (usually computers).

NTP

(Network Time Protocol) is a protocol that assures accurate local timekeeping with reference to radio and atomic clocks located on the Internet. This protocol is capable of synchronizing distributed clocks within milliseconds over long time periods. It is defined in STD 12, RFC 1119.

OCTET

An octet is 8 bits. This term is used in networking, rather than byte, because some systems have bytes that are not 8 bits long.

PABX

(Private Automated Branch Exchange) also commonly called a "PBX", or "Telephone Switch".

PACKET

A packet is a basic communication data unit used when transmitting information from one computer to another. The maximum length of a packet depends on the communication medium. As an example, in Ethernet networks the maximum length is1500 bytes. A data packet can be divided into two parts: the header part and the data part. The header contains information needed for communication between nodes; the data is the body of the packet that is ultimately received by the application.

PBX

(Private Branch Exchange) switching system of business or other organization that serves its telephones over a common group of lines from the central office.

PEG COUNT

A count of the number of times a circuit or piece of apparatus is used in a given period.

PING

(Packet InterNet Groper) is a program used to test if destinations can be reached by sending them an ICMP echo request and waiting for a reply. The term is used also as a verb: "Ping host X to see if it is up!"

PORT

A port is a 16-bit number (the allowed range being 1 through 65535) used by the TCP and UDP protocols at the transport layer. Ports are used to address applications (services) that run on a computer. If there was only a single network application running on the computer, there would be no need for port numbers and the IP address only would suffice for addressing services. However, several applications may run at once on a particular computer and we need to differentiate among them. This is what port numbers are used for. Thus, a port number may be seen as an address of an application within the computer.

PROTOCOL
A mutually determined set of formats and procedures governing the exchange of information between systems.

PROTOCOL STACK
A layered set of protocols which work together to provide a set of network functions.

PROXY ARP
A technique employed by routers to obtain IP datagrams for forwarding. The router answers ARP requests for non-local IP address with its own hardware address, ensuring that all datagrams for that IP address will be sent to the router.

RARP
(Reverse Address Resolution Protocol) is a network layer protocol allowing hosts to discover their own IP address from a hardware address

REMOTE ACCESS
The ability to access a computer from a location outside the building in which it is housed. Remote access requires communications hardware, software, and actual physical links, although this can be as simple as common carrier (telephone) lines or an Internet connection.

RD
(Receive Data) The RS-232 line that actually carries the incoming data.

RFC
(Request For Comments) is the document series, begun in 1969, which describes the Internet suite of protocols and related experiments. Not all (in fact very few) RFCs describe Internet standards, but all Internet standards are written up as RFCs. The RFC series of documents is unusual in that the proposed protocols are forwarded by the Internet research and development community, acting on their own behalf, as opposed to the formally reviewed and standardized protocols that are promoted by organizations such as CCITT and ANSI. They are available at http://www.rfc-editor.org/rfc-index.html

RI
(Ring Indicator) A control signal used by a modem to indicate the occurrence of a telephone ring signal. Used by auto-answer modems so that they know when to "answer" the incoming call.

RJ-45
Standard connectors used for unshielded twisted-pair cable.

ROUTING
The function of determining the route a packet should take from a subnet to get to another subnet. A component function of all internetworks, or internets. It is the process of delivering a message across a network or networks by the most appropriate path.

RS-232C

A standard, established by the Electronic Industries Association (EIA) in 1969 to define the electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit Terminating Equipment (DCE). The standard dictates the voltage ranges, control signals and pin assignments. A typical example would be a connection between a PC (a DTE device) and a modem (a DCE device). The RS-232 standard is the most commonly used serial interface today.

RTS

(Ready To Send) A control signal sent by a DTE device to a DCE device to inform the DCE that the DTE has data ready to send.

SERIAL DATA

Data that is transmitted sequentially, one bit at a time. For example, if a byte consists or eight bits, a parallel link would send one byte (all eight bits) simultaneously over eight data lines. A serial transmission would send that same byte one bit at a time, over a single data line.

SERIAL PORT

A port that sends and receives serial data. Most PC's are equipped with one or two serial ports.

SERVER

A provider of resources (e.g. file servers and name servers).

START BIT

Because asynchronous communications use no clock to regulate data transmission, start bits and stop bits are used to signal the beginning and end of a byte.

STOP BITS

Because asynchronous communications use no clock to regulate a transmission, start bits and stop bits are used to signal the beginning and end of a byte.

SUBNET

A portion of a network, which may be physically independent, that shares a network address with other portions of the network and is distinguished by a subnet number. Subnets are created and supported by the use of routing.

SUBNET ADDRESS

The subnet portion of an IP address.

TCP/IP

Transmission Control Protocol/Internet Protocol is a combined set of protocols that performs the transfer of data between two computers. TCP monitors and ensures correct transfer of data. IP receives the data from TCP, breaks it up into packets, and ships it off to a network within the Internet. TCP/IP is also used as a name for a protocol suite that incorporates these functions and others.

TCP

(Transmission Control Protocol) An Internet Standard transport layer protocol defined in STD 7, RFC 793. It is connection-oriented and stream-oriented, as opposed to UDP. See also: connection-oriented, stream-oriented, User Datagram Protocol.

TD

(Transmit Data) The RS-232 line that actually carries the outgoing data from one device to another.

TELNET

A portion of the TCP/IP suite of software protocols that handles terminals. Among other functions, it allows a user to log in to a remote computer from the user's local computer.

TOPOLOGY

A network topology shows the computers and the links between them. A network layer must stay abreast of the current network topology to be able to route packets to their final destination.

TWISTED PAIR

Network cabling that consists of four pairs of wires that are manufactured with the wires twisted to certain specifications. Available in shielded and unshielded versions.

SWITCHED NETWORK

Nationwide complex of diversified channels and reliable switching equipment that automatically routes communications to their destinations.

UDP

(User Datagram Protocol) An Internet Standard transport layer protocol defined in STD 6, RFC 768. It is a connectionless protocol that adds a level of reliability and multiplexing to IP.

WAN

(Wide Area Network) A network connecting computers within very large areas, such as states, countries, and the world.

Index

AC 6, 7, 9, 125, 126
Access 1, 83, 115
Accessories 7, 9, 67, 83
Account 75
Accounts 30, 58
ACT 5, 6, 126, 127
Address 4, 21, 23, 24, 35, 49, 51, 67, 68, 70, 71, 83, 84, 85, 88, 93, 94, 113, 119, 129, 134, 136
Addresses 24, 35, 52, 67, 68, 119
Ambient 126
ARP Command 84
ARPANET 24, 33, 67, 89
ASCII 13, 27, 28, 69, 88, 91, 104, 105, 107, 109, 111, 120
Baud 3, 13, 15, 18, 19, 28, 87, 112, 119, 120, 126
BAUD_RATE 92
BE 107
BOUND 71, 93
Browser 4, 25, 57, 85, 98
Cancel 20, 46
Capacity 71, 110, 112
CAUTION! 56, 57
CDR 3, 13
CHARGEN 4, 5, 26, 70, 72, 120
CL 108
Collecting Data 87
COM 9, 15, 24, 125, 132
Command Sets 91
Commands 3, 4, 29, 40, 70, 71, 87, 88, 91, 92, 93, 96, 102, 104, 106, 107, 109, 111, 121
CONTROL PORT 1, 3, 9, 15, 20, 58, 76, 91, 92, 96, 108
Control Port Statistics 37, 71
CR/LF 91, 92, 94, 109
Ctrl 6, 40, 69, 92, 107, 116, 127
DA 109
Data Collection 13, 27, 28, 72, 120
Data Communications Equipment 6, 10
Data Memory 106
DATA PORT 4, 20, 76, 92, 108, 109
Data Port Wiring 10, 116
Data Retrieval 6, 26, 37, 70, 71, 72, 87, 88, 91, 97, 107, 109, 120, 121
Data Retrieval Port Statistics 37
Data Source 3, 10, 13, 58, 116
Data Terminal Equipment 6, 9, 10, 131, 132, 137
databuffers.com 2, 4, 125
DB 108
DC 6, 9, 125, 126
Debugging 20
Default 24, 25, 26, 70, 71, 93, 106, 112, 119
Delete 34, 70, 90, 107, 113, 122
DHCP 4, 5, 21, 22, 23, 37, 38, 47, 49, 55, 59, 70, 71, 78, 93, 94, 95, 96, 113, 115, 120, 126, 131
Dimensions 126
DISABLED 26, 93, 120

Disconnect 18
DNS Server 22, 24, 59, 70, 93, 94, 95, 113, 119, 120
Domain 24, 33, 70, 71, 89, 93, 95, 120, 132
Doorbell 4
D-SUB 126
DU 108, 109
Duplex 54, 71, 77, 119
ECHO 4, 5, 26, 35, 70, 72, 97, 98, 120
Electrical 1
Enable 22, 23, 29, 35, 55, 112, 113, 120, 121, 123
ESC 109
Ethernet Address 68
Ethernet Configuration 54, 77, 119
Ethernet Connection 10, 21
Ethernet Port 3, 10, 21, 83
Exit 19, 21, 47, 112
Extended 54, 71, 77, 116, 119
Factory Default 106, 119
firewall 52, 69
Flash 2, 14, 21, 126
Flash Program Memory Update 43
Flash Update 21, 41, 43, 44, 45, 46, 107, 116
Format 28, 71, 112, 121
Found 85
FTP Upload 33, 61, 87, 89, 100, 101, 122
Gateway 24, 70, 71, 93, 119
GENERATOR 96, 97
GET 91
Hardware 71, 125
Home 53
Host 22, 24, 47, 70, 95, 120, 131
HTTP 4, 5, 25, 51, 71, 98, 103, 115, 120, 121, 126, 133
Humidity 125, 126
HyperACCESS 67, 69
HyperTerminal 67, 69
ID 36, 108, 111, 112, 115, 126
IM 69, 88, 107, 108
INIT 93
Input 13, 126
Installation 9, 15, 21, 22, 83
Interactive Monitor 67, 85, 88, 107, 108, 110
Internet Protocol 4, 28, 93, 133, 137
Introduction 1
IP Address 21, 23, 24, 35, 51, 67, 68, 70, 71, 83, 88, 93, 94, 113, 119
IP Configuration 31, 56, 73, 93
IPCONFIG 83
IPv4 23
LAN 83, 134
Lease 37, 59, 71, 93
LINK 5, 6, 10, 22, 126, 127
Linux 23, 51, 68, 83, 84
Logging 69
Logon 69
MAC 83, 84, 134
Maintenance 4, 109
Mask 24, 35, 70, 71, 93, 119, 123

Memory 2, 21, 43, 106, 111, 115, 126
Menu 16, 17, 41, 70, 72
MODEM 9, 134
MR 108
Native 91
NetBIOS Name Resolution 4, 35, 51, 68, 72
Network Finder 47
Non-Contiguous Subnet Bits 24, 36
NONE 93
OK 91, 94, 108, 109
Overview 3
Password 1, 5, 34, 52, 58, 59, 69, 70, 71, 75, 85, 90, 103, 121, 123
PBX 3, 4, 6, 10, 13, 19, 28, 112, 113, 127, 131, 135
PC 1, 9, 15, 18, 19, 22, 45, 87, 88, 92, 131, 132, 137
Pentium 125
Performance and Statistics 36
Ping 22, 23, 72, 84, 135
PORT 1, 3, 4, 9, 15, 20, 58, 76, 91, 92, 96, 108, 109, 135, 137
Print 21
Program 1, 2, 4, 15, 17, 19, 20, 21, 43, 45, 67, 88, 91, 113, 115, 116, 125
RAM 115, 125
RARP 4, 49, 136
REBINDING 93
REBINDINGWAIT 93
REBOOTING 93
REBOOTINGWAIT 93
Record 27, 28, 70, 105, 112, 120, 121
RENEWING 93
RENEWINGWAIT 93
REQUESTING 93
REQUESTINGWAIT 93
Requirements 125, 126
Reserved IP Addresses For Private Networks 24, 51, 52, 67, 68, 119
Reverse ARP Configuration 83
RFCs 93, 132, 136
RH 125
RJ-45 ..... 6, 10, 11, 126, 136
RS-232C 3, 10, 13, 28, 104, 120, 126, 137
Run 6, 46, 115, 127
Samba 51, 68
Save 16, 20, 76
SD 108, 109
Secondary 24, 32, 70, 71, 93, 119, 122
SELECTING 93
SELECTINGWAIT 93
Serial Port Debugging 20
SET 91
SM 109
Specifications 1, 125, 126
Splash 17
SS 107, 109, 111
Standards 93
Start 67, 83
State 6, 13, 14, 71, 93
Status 4, 16, 20, 21, 106, 112
Subnet Mask 24, 119

SYN 107
TCP CHARGEN 26, 70, 120
TCP Configuration 57, 73, 96
TCP ECHO 26, 70, 120
TCP Parameters 25, 57, 73, 120
TCP Ports 25
TCP Security 35
TCP Settings 25, 51
TCP Timeout 25, 26, 70, 102
TCP/IP 1, 28, 35, 63, 64, 70, 72, 74, 88, 95, 102, 104, 120, 123, 133, 134, 137, 138
TCP/IP Filtering 35, 70, 123
TCP/IP Security 35, 63, 64, 70, 74, 102, 123
telcomresearch.com 23, 24, 31, 33, 51, 68, 70, 71, 89, 93, 96, 98, 99, 121
Telnet Configuration 5, 26, 69, 72, 121
Telnet Data Retrieval 87, 88, 91, 97, 107, 109
Telnet Interactive Monitor 5, 69, 88, 103, 107, 108
Telnet Protocol 4, 67, 97
Temperature 125, 126
Tips 17
Transmit 9, 10, 109, 138
Trouble Shooting 115
UART 37
Unix 22, 83, 84
User Name 5, 34, 52, 59, 69, 70, 71, 75, 85, 90, 103, 121, 122
Users Security 30, 102
Version 63, 71, 79, 113
Vibration 126
Voltage 125, 126
WARNING! 25, 126
WEB Browser 4, 25, 57, 85, 98
WEB Configuration 51, 85, 88
WEB Interface 5, 85
WEB Server 1, 51
WEB Site 4, 43, 53
Weight 126
Windows Configuration Program 1, 2, 4, 15, 17, 19, 20, 43, 45, 67, 88, 91, 116, 125
Windows Network 22, 51, 68
Windows Printing 21
WINIPCFG 83
WTI CRB 109, 110, 111
XP 67, 125
XT 109